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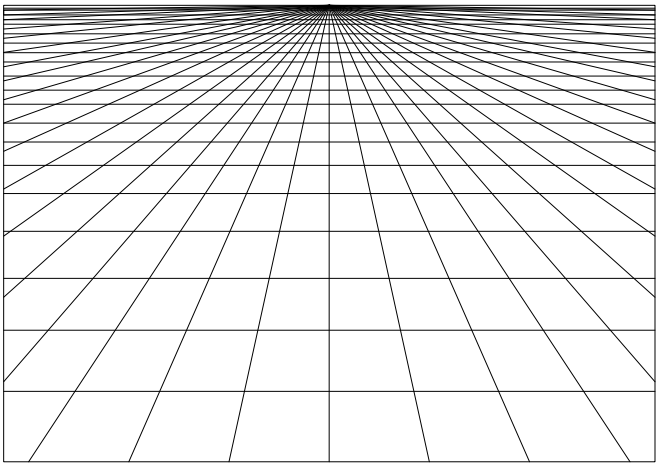

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Incorporating Wind Power into the Norwegian Energy System

An Analysis of the Ongoing Controversy on the Havsul Projects

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Science and Politics in Controversies on Nature
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Abstract

This thesis examines the ongoing controversy on the Havsul projects in the county of Møre and Romsdal, and aims to contribute to an understanding of why it has been difficult to incorporate wind power into the Norwegian energy system. In order to answer this question, the thesis adopts and combines the technological system approach with the theoretical and methodological insights from actor-network theory. By doing this, it 'opens up' the controversy and tries to make sense of who the actors are, and what strategies they employ to influence the political process.

The thesis argues that when the energy system tries to incorporate wind power, problems develop. In the wake of these problems, a scope of action is created where exogenous actors become able to challenge inner system logics. Through a debate on different conceptions of nature, these actors succeed in affecting the political process. Thereby, they challenge well-established system logics.

Keywords:

Wind power, the Norwegian energy system, conceptualisations of nature, exogenous actors, scope of action, technological systems, actor-network theory.

Acknowledgements

This thesis is largely based on interviews. I would therefore like to take the opportunity to thank all of them who gave me some of their time to tell me their stories. Without you, this thesis would not have been possible to make. I hope that you will find this thesis both accurate and interesting. As this controversy is not yet settled, there will necessarily be issues that are not addressed here. However, I hope that I have captured the most essential issues.

Writing this thesis has been an emotional rollercoaster. One could think that after having spent almost eight months working on this project that I would have reached some sort of conclusion on who is right and who is wrong in this conflict. Unfortunately, I have not. This conflict has proven to be more complex and emotional than what I ever thought it would be. I therefore wish all those who are involved, regardless the outcome, the best of luck.

There are several people who have supported me, and who in various ways have given their contribution to this thesis. My supervisor Sissel Myklebust has been an invaluable source of encouragement, guidance and support throughout this process. Erlend has given his contribution through countless of discussions. Thanks to Torill for last minute proofreading. My brother Rune has been a very useful source of discussion and input, not only on this thesis, but also throughout my time as a student. Thank you! I would also like to thank my parents for their support over the last six years. Even though you have questioned some of my choices, you have also been there for me. Thank you! Last but not least, I would also like to thank Bente. Without your loving support, this year would not have been possible. Thank you all!

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1 Introduction

During the last decade, the consumption of electricity in Norway has risen by 17, 1 TWh.[1] At the same time, the era of building traditional large-scale water power plants has come to an end. The total energy consumption in Norway is around 120 TWh, and a large amount of this energy comes from renewable energy sources. In 2002, the share of consumption that came from renewable energy production was 107%. However, according to the Norwegian Water and Energy Directorate, this share will gradually decrease and reach 94% by 2020. The increased consumption is today covered by imported electricity from fossil energy sources and from nuclear power plants from our neighbouring countries. This goes against the political intentions that are aimed at making Norway self-contained with electricity from renewable energy sources.[2]

Today, wind power is the most rapidly growing energy technology in the world. Norway has, for a long time been hesitant when it comes to using wind as a source for energy production. In 2004, wind power only contributed with 0.3 TWh, but an official goal has now been set for expanding the production to 3 TWh by 2010.[3] However, due to a growing animosity against wind power from the people who live in the areas where the wind farms are planned, the tourist industry, and some environmentalist organizations, the future role of wind power in the Norwegian energy system is highly uncertain.

The expected power crisis in the mid-western part of Norway has brought about a demand for new sources of power. Despite the fact that the country to a large extent has been self supplied with hydro electric power, there is now a perceived need to expand the production of energy further. This has lead to increased pressure from the local politicians, the

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[1] Troms Kraft (Accessed 23.08.2006) http://www.troms-kraft.no/vie/bedrift/aktuelt_i_energibransjen/ebl_priser_stige.htm,
[2] NVE (2005), "Kraftbalansen i Norge mot 2020".
[3] White Paper No. 29 (1998-99) *Om energipolitikken.*

Norwegian Confederation of Trade Unions, the Confederation of Norwegian Business and Industry, and the power demanding industry for permission to build gas-fired power plants with an exemption from the imposed official requirement for complete CO2 cleansing. At the same time, it has created a context for the establishment of other forms of energy production. Nevertheless, the plans for building the world's largest wind farms in this region, *the Havsul projects*, have become highly controversial.[4]

Havgul AS is responsible for the Havsul projects. The company has applied to the Norwegian Water and Energy Directorate (NVE) for a licence to build three wind farms: Havsul I, II and IV. The total production capacity of the entire Havsul projects is estimated to 4.2 TWh, which is sufficient to supply 210.000 households.[5] These wind farms are planned localized offshore, on the coastline of Møre and Romsdal in the mid-western part of Norway.[6] The reason why they have chosen this location is, according to Havgul, mainly a combination of three factors. Firstly, there are good wind conditions in the area. Secondly, as a result of the development of the Ormen Lange gas field, a strong grid that can handle all the electricity, and thereby ensure that the transfer loss will be minimal, has been built in the area. Finally, there are large available areas offshore in this region. In addition, there is also a growing energy deficit in the region, and the area is fairly scarcely populated. These factors, combined with a growing demand for electricity, make the area unique not only in a Norwegian context, but also in a European context.[7] Nevertheless, the resistance against these plans has been massive, and because the affected municipalities have approved only one of these projects, the most likely outcome of the controversy is that, if any, only one of the wind farms will see the light of day.

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[4] The use of the words wind farm and windmill, has attracted criticism from several actors. They argue that the words have incorrect connotations and should instead be replaced with words like industrial area and wind turbine. In this thesis, I will take the middle course, and use the words wind farm and wind turbine.
[5] Adresseavisen (2006) "Dette er Havsul".
[6] See appendix IV for a map of the plan area.
[7] Interview with Harald Dirdal, Havgul AS, 19.05.2006.

In this controversy, different conceptions of *nature* have become the focal point of the debate. What is at stake here is nature in all different forms, and these conceptions are being used as an argument for both the followers, and the opponents, in their attempt to influence the political process. This thesis approaches the conflict by using the theoretical and methodological insights from both actor-network theory (ANT) and the technological system approach (Hughes 1987), in an attempt to give an answer to why the Norwegian energy system apparently fails in the attempt to incorporate wind power (on a large scale) into the system. What kind of strategies does Havgul employ, and what are the strategies of their opponents? Why does the wind power opposition succeed in challenging well-established system functions that have been unchallenged for years?

In the following chapter, I will present a brief historical overview of the conflict, from the advanced notice for the Havsul projects in 2004, up to the present date where the outcome of the hearing round on the licence applications are known. In chapter 3, I will present the technological system- and the ANT approach. These two approaches will serve as my main theoretical framework. This is because in the struggle to conceptualise nature, exogenous actors have managed to influence the political process. Hence, I will argue, there is need to adopt a theoretical framework that allows us to 'open up' the controversy, and study how and why the different actors become influential. The methodological insights from ANT will also be discussed in chapter 4, where I will give a short presentation of my methodological approach. In chapter 5, I will present four conceptualisations of nature, which have been discernible in the debate, and analyze how the actors have used these to position themselves. These conceptualisation, I will argue, became important in this conflict, because as the system encountered problems, actors from the system's environment became able question the conceptualisations that Havgul and the energy system had defined.

2 An Historical Overview of the Controversy

> "We will enter facts and machines while they are in the making; we will carry with us no preconception of what constitutes knowledge; we will watch the closure of the black boxes and be careful to distinguish between two contradictory explanations of this closure, one uttered when it is finished, the other while it is being attempted. This will constitute our **first rule of method** and will make our voyage possible" (Latour, 1987, p. 15).

Controversies are interesting because they allow the researcher to study how some actors become relevant to the construction of the actor-networks, while others do not (Law, 1998, p. 18). Furthermore, it makes it possible to pick apart the preconceptions of the protagonists and detect the weaknesses in their positions (ibid). In this sense, the study of an ongoing controversy makes it possible to study 'science in action' and analyze the conflict before it is black boxed.

The controversy on the Havsul projects has involved several actors. In this part of my thesis, I will show how some actors became important by presenting a short recapitulation of the conflict's history from its beginning up to the present date. This will also serve as an historical frame that makes the reading of the analysis easier to follow.

2.1 The Havsul Projects: From Advance Notice to Licence Application[8]

December 2004, Havgul AS sent out an advance notice for the construction of four offshore wind farms, Havsul I, II, III and IV, on the coastline outside the county of Møre and Romsdal. The projects affected six municipalities: Sandøy (Havsul I), Giske and Haram (Havsul II), Fræna (Havsul III), and Eide and Averøy (Havsul IV). Included in the notice were also the plans for an electrical transmission installation that affected a number of places in the municipalities of Aukra, Giske and Ålesund. The total plan area was approximately 257 square kilometres and it was estimated that the projects' total output would be approximately 1400 MWh. The scales of the proposed projects were much larger than any wind farm ever built in Norway before, and, if carried out, it would be the world's largest offshore wind power project both in terms of scale and in terms of effect.[9]

For many of the affected municipalities, the Havsul projects were not their first experience with wind-power related applications. The main reason why so many companies

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[8] Formal procedure for wind power licence applications (Accessed 11.07.06)
http://www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=8480
The Norwegian Water Resources and Energy Directorate (NVE) is the decision-making body that oversees the application process for wind-power, and grant a licence to the projects that they find socioeconomic beneficial. When a company applies for a licence to build a wind farm, they have to go through a standard four-step procedure:

- Send out an advance notice to the NVE. This notice has to include suggested investigation program. The advance notice is also sent out on a hearing round.
- The NVE, in consultation with the Ministry of the Environment, decides upon an impact assessment program (consequence investigation) based on the suggested investigation program, statements from the hearing round and the NVEs own assessments.
- When the company has conducted the impact assessment study, they send the impact assessment report and the licence application to the NVE. The NVE then conducts a hearing round.
- If, in the impact assessment study or from other sources, it is revealed new information, and this information is of vital importance to the investigation of the effects the project could have on the environment, natural resources or society, the NVE can demand an additional investigation. Finally the NVE makes the decision of whether or not a licence should be granted. The licence application process normally takes six months. However, if the decision is appealed, the NVE send their report to the Ministry of Petroleum and Energy. The Ministry then has to prepare the case for the parliament and enclose their recommendation. In large, controversial cases, a parliamentary bill is presented before the parliament. After this, the King in Council formally grants the licence.

[9] The advance notice (December 2004):
http://www.havsul.no/files/bildeweb/forhondsmelding%20web%20format.pdf

have invested money in wind-power the last couple of years is that it has been signalled that it is a political goal to increase the production of renewable energy in Norway. As a part of this process, the Parliament stated in 2002 that they wanted to improve the political- and economic conditions for renewable energy by establishing mutual *green certificate market* with Sweden. The idea was that the green certificates would be issued to producers of new renewable electricity who could trade them on the certificate marked. These certificates would then be sold to consumers, who in turn were required to make sure that a certain percentage of the electricity they would buy was green electricity. The plans for this scheme came about when the Parliament instructed the coalition Government (Bondevik II) to examine the possibility for a system with green certificates adjusted to Norwegian and Nordic conditions. However, in February 2006 the plans were abandoned after the two countries had failed to reach an agreement in the negotiations.[10]

The advance notice was sent out on a hearing January 17th, 2005, and the deadline for hearing statements was set to the March 18th. However, when Havgul and the NVE conducted popular meetings with the inhabitants and met with the local politicians in the affected municipalities to inform them about the projects and the official procedures for licence applications for wind farms, they met resistance. This resulted in a decision to compress the plan area for the projects, and an additional notice was sent out in February 2005.

2.1.1 The Hearing Round: The Advance Notice Faces Opposition

The Townspeople

The notice soon spurred large protests from various actors, both locally and nationally. At this stage, the townspeople were not well organised and protests came mainly from individuals. In

[10] Press release from the Norwegian Ministry of Petroleum and Energy (27.02.2006) http://odin.dep.no/oed/english/news/press_releases/026021-070204/dok-bu.html

addition to some readers' letters in the local newspapers and the response from the popular meetings, 14 of the hearing statements came from individuals who wanted to protest against the Havsul projects.[11] The hearing round also included the statements of some more or less organised groups of townspeople. Four of these groups clearly stated that they were against the plans, and therefore recommended that NVE did not grant a licence to the projects.[12] The Kjønnøy residents' association in the municipality of Averøy were more reserved in their statement and only pointed out areas that needed to be investigated in the impact assessment study. However, they did not take sides. In fact, only one of these groups, the Løvsøy bygdeutvalg (rural committee), stated that they supported the Havsul projects.[13]

Interest Organisations

While these groups protected the interests of the local inhabitants in a broad sense, other groups had a narrower field of interest. Some of these came to play an important role in the debate that that followed

The Norwegian Ornithological Society (NOF) Division Møre and Romsdal, and Friends of the Earth Norway (FoEN), were the only two *environmentalist organisations* that gave their statements in this hearing round. Although their conclusions were quite similar, these two organisations chose to approach the topic quite differently. While the NOF-M&R chose to go against the establishment of the wind farms in this area, arguing that the Havsul projects would pose a critical threat to a large number of bird species, FoEN, although critical, did not exclude the possibility that parts of - or even all the Havsul projects could be realised. Instead, they listed up several areas that they wanted investigated in the impact assessment study. The NOF-M&R also pointed at some areas that needed to be investigated more closely,

[11] Summary of the hearing statements and the impact assessment program: http://www.havsul.no/files/bildeweb/bakgrunn.pdf
[12] Ibid. Hustadvikas venner, Nordre Bjørnsund vel, Vikan residents' association and Bergset vel.
[13] Ibid

but overall it seems that the position of FoEN to a larger extent than the one used by the NOF-M&R was to be considered as an invitation to a dialogue. This can be one of the reasons why the NOF-M&R has come to play a less conspicuous role in this controversy compared to the one they played in the debate on for example the Smøla project, which is another wind farm in the area.[14]

There were also organisations that protected certain areas of what could be called *local practice*. For them, what was at stake, was their everyday life, and for some also their means of livelihood. The Norwegian Association for Hunters and Anglers, the North-Møre and Romsdal Council for Outdoor Life, the Association of Sea Tangle Trawlers, and the Fishermen's Association in Sunnmøre and Romsdal were among the most influential of these groups. All of these organisations gave statements in the hearing round, and their views were therefore a part of the material that formed the basis for the formulation of the impact assessment program. However, there were also affected interest groups that did not give their statement in this hearing round. The Norwegian Diver Association, for example, clearly opposed the Havsul IV project, but did not take any formal action before they gave their hearing statement on the licence application.[15]

Apart from environmentalists and townspeople, the Havsul project also came in conflict with other areas of business in the area. The hearing round clearly showed that the coastline outside the county of Møre and Romsdal is an important source of income, not only for anglers and for trawlers, but also for the *tourist industry*. Thus, the hearing round included statements from various hotels and restaurants in the area who opposed the projects. However, their protests were also carried by two, larger and more influential organisations, namely the Directorate of Public Roads (DPR) and the Norwegian Hospitality Association (RBL). The DPR's main concern was that the Havsul projects are not compatible with plans to include the

[14] See Bjørgen, Tollef G. (2005) for a case study of the Smøla project.
[15] "NDF kritisk til Havsul" (05.11.2005): http://www.ndf.no/t2.asp?p=4328&x=1&a=149193

Atlantic Ocean Road as a part of the National Tourist Road project. Large-scale wind farms, they argued, are not compatible with the landscape DPR wants to show from the National Tourist Road; unique and untouched nature. Thus, the Directorate of Public Roads decided to impose a moratorium on the plans for this road until NVE decides on the future of the Havsul projects. This decision was also the main concerns of the RBL. In their hearing statement, they expressed the concern that the wind farms could cause a serious setback for the tourist industry in the area.

Central Authorities

The hearing round also included statements from central authorities like the Directorate of Fisheries- Region Møre and Romsdal, the Directorate for Nature Management, the Directorate of Cultural Heritage, the Civil Aviation Authority, Avinor AS, the Norwegian Coastal Administration and the Norwegian Institute of Public Health. At this point in the process, these authorities only held a consultative function, and none of them took sides in the controversy. Their function was limited to ensure that all potential consequences were investigated correctly, and included in the impact assessment program.

Local and Regional Authorities

In wind power issues, the decisions taken by the municipalities carry a lot of weight. In fact, since the NVE have not yet overruled any such decisions made by municipalities, they can almost be regarded as a limited veto. This does not, however, mean that the municipalities are in complete control of which projects the NVE do - or do not grant a licence. Even if one municipality is in favour of a certain project, the NVE can still decide to go against it. In other words, the municipalities are in a position where they can lay down a veto if they do not want a wind farm, but not the other way around.

At this point in the process, only one of the affected municipalities, the municipality of Fræna, clearly stated that they opposed the Havsul projects. The county of Møre and Romsdal and the other municipalities were, however, not conclusive in their statements and focused on commenting on the impact assessment program. This was probably a decisive factor in Havgul's decision to go on with their licence application.

The results of the hearing round

In the hearing round, it became evident that the Havsul projects were highly controversial, and especially the plans for Havsul III. Thus, based on the response from the municipality of Fræna, the county of Møre and Romsdal, and the DPR, the NVE decided to request that Havgul AS put the plans for Havsul III on hold.[16] However, the NVE recommended Havgul to prepare an impact assessment study for the three remaining projects. Hence, based on the inputs from the hearing round, popular meetings, meetings with the municipalities and their own assessment, the NVE determined the investigation program. Then, after they had presented it to the municipalities in order to make sure that nothing was left out, the impact assessment program was sent to Havgul, and it was now up to them to conduct the study.[17]

2.2 The Townspeople Unite

At a press conference in November 2005, Havgul announced that Tafjord Kraft AS had invested in Havsul II AS and now owned 50% of the shares in the company. Tafjord Kraft AS, is the largest power supplier in the region, with a yearly production of 1.2 billion kWh of electricity. In comparisons, the Havsul II project is estimated to have a yearly production of

[16] Havsul III. Request to put plans on hold (19.04.2005).
http://www.nve.no/FileArchive/308/200500115_104.pdf
[17] Summary of the hearing statements and the consequence investigation program:
http://www.havsul.no/files/bildeweb/bakgrunn.pdf

2.2 billion kWh.[18] Hence, if the project was carried out, it would significantly increase Tafjord Kraft's market share in this region.

At the press conference, Havgul also presented a visual animation of the Havsul projects. The animation was made by the University College of Ålesund, and was shown to the townspeople the day after the press conference. This visualisation shocked many people, and spurred a social commitment locally. Among the audience was Torill Molnes, who later became the leader of the nationwide umbrella organisation "Stopp Raseringen av Kysten" (Stop the Destruction of the Coast (SRAK)). She explained what happened like this;

> "It all started in November when I was asked to give a statement to a local TV-channel. Back then, I did not know anything about energy. At the same time … we saw these gigantic plans… We had to react! We cannot sit around with our hands folded and watch as they destroy the entire rural community and the coast up here".[19]

The organisation SRAK was founded in December. The purpose of the organisation is to coordinate the local opposition against the expansion of wind farms in Norway. Today, the organisation consists of civilian protest groups from the entire country. The fact that they have become a nationwide organisation has made it difficult for wind power supporters to ignore them, and the townspeople who oppose wind farms have gotten a powerful spokesperson that attends to their interests in wind power related issues. This has also been the case in the debate on the Havsul projects where the organisation in many ways has become the symbol of the local resistance.

2.3 The Licence Application

In February 2006, Havgul sent in the licence application and the impact assessment study to the NVE. These were then sent on a hearing round. The deadline for hearing statements was

[18] Press release (14.11.2005): http://www.iogm.no/havsul/Index.asp?Lang=Nor&Meny=&Sub=&nid=17
[19] Interview with Torill Molnes from the SRAK 13.06.2006.

originally set to the 15th of May, but was later extended. The main reason for this is that the municipality of Giske decided to conduct an advisory referendum the 18th of September over the Havsul issue. Havgul therefore took the initiative to postpone the deadline for all the municipalities until the 30th of September.

The plans for the Havsul projects were presented at a press conference the same day. The plans got massive media attention, both in local- and national media. In addition to the actors that I have already mentioned, this hearing round also included statements from another important group of actors - namely the environmentalists. While the advance notice only resulted in hearing statements from two environmentalist organisations, the second round also included statements from, among others, Nature and Youth, Zero (Zero Emission Research Organization), and Green Warriors of Norway.

This hearing round is also different from the first one in the sense that the local and regional authorities have to say yes or no to the projects. So far, the county of Møre and Romsdal have said yes to Havsul I, and no to II and IV. However, the county does not close the door on Havsul II entirely. Instead, they say that they will consider this project in light of the experiences that will be gained for Havsul I.[20] Only three of the six affected municipalities, the municipality of Eide (Havsul IV), the municipality of Haram (Havsul II), and the municipality of Sandøy (Havsul I) have said yes to any of the Havsul projects.[21] The municipality of Ålesund (indirectly affected by Havsul II), Fræna (Havsul IV), and Averøy (Havsul IV) have all said no.[22] In addition, because the people of Giske voted against the plans for Havsul II in the advisory referendum, it is very likely that the municipal council here will advise the NVE to go against the project. In other words, if the NVE does not change their practice with letting the decisions of the municipalities' count as a limited veto, they can only grant a licence to Havsul I.

[20] Hearing statement: The county of Møre and Romsdal .
[21] Hearing statement: The municipality of Eide.
[22] Hearing statements: The municipality of Ålesund, Fræna, and Averøy.

3 Weaving the Seamless Web: A Theoretical Framework

3.1 The Technological System Approach

By using a system metaphor on technology, Thomas Hughes wants to transgress the distinction between micro and macro and tie them together in the analysis. Thus, the system metaphor stresses the importance of paying attention to the different but interlocking elements of physical artefacts, institutions, and their environment. Thereby, it offers an integration of technical, social, economic, and political aspects (Bijker et al. 1987, p. 4).

In the article, "The Evolution of Large Technological Systems" (1987), Hughes starts by saying that technological systems contain messy, complex, problem-solving components. These components are both socially constructed and society shaping. Among the components are such heterogeneous components as physical artefacts, organizations (like for instance manufacturing firms, utility companies and banks), scientific institutions, official authorities, legislative artefacts, and natural resources (ibid). These components are organised around a common system goal: the development of a technology (p. 51). The Norwegian energy system for example, is tied together by one superior system goal: the production of electricity and the incorporation/ development of new energy technologies to meet the increasing demands for electricity.

3.1.1 System Builders

How then, is it possible to form unity (or organisation around a common system goal) from these heterogeneous bits and pieces that make up the system's components? Hughes' answer to this is that the components of a technological system are socially constructed. The *system builders* and their associates invent them. Hughes characterizes the system builder as someone who has "the ability to construct or force unity from diversity, centralization in the face of

pluralism, and coherence from chaos" (Hughes, 1987, p. 52). In other words, successful entrepreneurs are those who think in system terms, not only about the technical character of their innovations, but also about their social, political and economic context. The successful system builders are therefore those who can invent hardware as well as organizations. Edison is Hughes' prime example of a system builder. Not only did he design devices, but societies within which these devices might be successfully located.

Hughes' concept of system builders is, as I will elaborate on under the recapitulation of the actor-network approach, to some extent an equivalent to Law's concept of *heterogeneous engineering.* However, these two concepts differ in the sense that Law also incorporates into the analysis actors that are regarded as exogenous (or a part of the environment) in the system approach.

3.1.2 Boundaries: What is Exogenous, and What is Endogenous?

A system is characterized by the fact that it is demarcated against the surrounding environment, and that it is organised around a common system goal that binds the inner elements. Hughes calls the world outside of technological systems that shapes them or is shaped by them, the *environment.* Even though it may interact with the system, the environment is not a part of the system because it is not under the control of the system unlike the system's interacting components (Hughes, 1994). The fact that actors like protest groups, environmentalists, and non-human actors like sea birds are regarded as exogenous elements in the system approach makes sense when the target of analysis is large established technological systems like the electricity system. However, by seeing these actors as exogenous, one also disguises the process that has led up to the black boxing of each of the system components. Moreover, as my case study shows, without including these actors into the analysis, it is impossible to fully grasp why the Norwegian energy system has difficulties

with incorporating wind power. These actors challenge the system logics and should therefore be analyzed in the same terms as the system components.

Technological systems are, however, also *subsystems* in larger systems as well as systems of their own. Wind power for instance, is a subsystem of the *Norwegian energy system*. This subsystem is striving to become an influential part of the energy system, but it is so far a system with limited influence both in terms of scale and in terms of complexity. Hence, the future expansion of the wind power system relies on the Norwegian energy system.

Inherent in Hughes' concept of technological systems, is a pragmatic attitude towards the question of boundaries. Modern technological systems are expanding, and it is therefore impossible to determine a-priori what is exogenous or endogenous elements of the system. Furthermore, even after prolonged growth and consolidation, technological systems do not become autonomous; they acquire *momentum* (Hughes, 1987, pp. 76-80). The systems are embedded in a seamless web of technology and society, and remain both socially constructed and society shaping - both cause and effect. However, as they grow larger and more complex, systems tend to be more shaping of society and less shaped by it. Shaping therefore becomes increasingly difficult as the system grows more complex and acquires political, economic, and value components (Hughes, 1994, p. 112). Hence, the system is also time dependent. In this sense, technological momentum offers "an alternative to technological determinism and social construction" (p. 102). This is because both technological determinism and the social construction approach fail to adequately handle the question of technological change (ibid). The upshot of this is a set of concepts that enables us to study the interrelatedness of society and technology without falling into the infamous distinctions between social and technological determinism, and between micro - and macro actors. Instead, it offers valuable insight and tools for understanding how large technological systems are constructed in a

seamless web of heterogeneous components. Hence, it contributes to an understanding of both the construction of, and the *obduracy* of large technological systems.

The Norwegian energy system is an example of a system that has reached a powerful momentum. However, because the system is both socially constructed and society shaping, it is by no means autonomous. On the contrary, as my analysis shows, exogenous groups are now questioning system components and system functions that have been unquestioned for years. The reason for this, it seems, is that system logics are to a large degree technology specific. That is, when a technology has been fully incorporated into the system, the controversial aspects of it becomes black boxed. Thus, the incorporation process becomes a struggle to define all elements of the technology in question and thereby incorporate both the hostile environment and the new technology into the energy system.

3.1.3 Technology Transfer

When a technological system is transferred from one location to another, it is reshaped within a local context. However, it is hard to tell which part of the system components that will be the most or the least plastic; the technological "hard-ware" or the social or cultural "soft-ware".[23] It is also unclear whether it is the system or the new surroundings that has to adapt - and how. Adapting to a new culture might demand technological changes as well as changes in the social organization. Alternatively, the system can force such changes upon the social patterns of "foreign" cultures.

Reducing the sources of uncertainty is imperative for the technological transfer to be successful. Thus, it becomes a paramount objective for the system builders to remove the sources of uncertainty and incorporate the most crucial part of the environment into the system. If, for example, one is going to succeed with the expansion of wind power in Norway,

[23] See Moser, I. (1993, p. 183) for similar argument.

certain parts of the hostile environment has to be incorporated into the system. The ongoing debate about "on who's side is nature really on" in the Havsul controversy, illustrates this point well. The picture of wind power as environmentally sound is one of the industry's most valuable assets. Thus, when transferring the wind power system to Norway, it becomes imperative for the system builders (in this case Havgul) to redefine nature in such a way that it includes large-scale wind farms. Here, the consequences on for example the bird population have to be addressed both in terms of modifications of the plans, and in terms of defining nature in such a way that the threshold for taking risks is lowered.

According to Hughes, the expansion of systems can be described as going through seven phases in which the activity named predominates: invention, development, innovation, transfer, growth, competition and consolidation (Hughes, 1987, pp. 56-76). These phases are, however, not sequential or linear. They overlap and backtrack. When an invention becomes an innovation, gets equipped with a social organization, expands, and is transferred, new problems develop. Hughes calls this *"reverse salient"* (p. 73). This concept suggests an unequal pace of change within the system. Such an imbalance may occur between different technological components, or between the technological and the organizational components. In other words, it describes those components in an expanding system in need of attention from the system builders. The failed attempt by the Norwegian government to establish a mutual *green certificate market* with Sweden is a good example of a reverse salient. After the parliament in 2002 had indicated that, they wanted to improve the political and economic conditions by establishing a green certificate market, several actors started to invest in wind power. In other words, they took the initiative to transfer and expand the wind power system in Norway.[24] Thus, when the plans were abandoned in 2006, it constituted a serious setback

[24] At the time being, there were actually several wind farms in Norway. However, their contribution to the total energy production was marginal.

(or a reverse salient) for the technological system. A setback that needed increased attention from the system builders.

3.2 Actor Network Theory (ANT)

The ANT approach extends the analysis of the system building process one step further. They do this by breaking down the distinction between human and non-human actors. Both are treated as elements in 'actor-networks'. One cannot, Callon (1987) argues, determine a-priori who the actors in development of a technology are, and which properties they possess. Human beings, technologies, and natural phenomena can all be elements in a material semiotic actor-network, and should therefore be regarded as actors. The conflict on the Havsul project illustrates why it is so important to include into the analysis every actor that contribute to the construction of the actor network. Unlike the system approach, ANT allows the researcher to also incorporate actors that Hughes would have regarded as exogenous into the analysis. In order to provide an answer to why the Norwegian energy system fails to incorporate wind power into the Norwegian energy system, I find it necessary to incorporate both protest groups, environmentalists, and non-human actors like birds.[25] This is, as Donna Haraway notes, because nature is "a co-construction among humans and non-humans" (1992, p. 297).

Further, a central premise in the ANT approach is to question taken for granted sociological concepts like micro- and macro actors, actors and structures, individuals and institutions. In fact, they accuse sociologists of confirming relations of power by applying different analytical tools when studying micro and macro actors (Callon & Latour, 1981). There is no inherent distinction between micro- and macro actors. On the contrary, macro-actors are micro-actors who have managed to black box their position. Hence, instead of

[25] Latour (1987, p. 84) suggests that the word actant should be used instead of the well-established actor concept. He does this because he wants to avoid making a distinction between human and non-human actors.

taking these distinctions for granted, the sociologist ought to *follow the actor* and try to make sense of how they construct the actor-network (Law, 1988, p. 1).

3.2.1 Translation Theory

Callon calls the process were agency is given and the actor-network is constructed, a process of *translation* (Callon, 1986). In the article, "Some elements of a sociology of translation; domestication of the scallops and the fishermen of St Brieuc Bay", he describes a scientific and economic controversy about the causes for the decline in the population of scallops in St. Brieuc Bay and the attempts by three marine biologists to develop a conservation strategy for that population. In the attempts of these researchers to impose themselves and their definition of the situation on others, four moments of translation are discerned, and to each of these there are corresponding strategies of power: *problematisation, interessement, enrolment, and mobilisation* (p. 196).[26]

Included in this process, is also an element of *simplification* (Law, 1988). Translating the heterogeneous bits and pieces into a functioning network, is a complex process. A functioning actor-network is the result of a process where heterogeneous bits and pieces are translated and juxtaposed. That is, they are put together in such a way that it seems normal, inevitable, and even natural that they act together as a functioning whole. However, every element or object is itself, also the end product of a process of simplification. That is, "every point is itself a network" (p. 14). In other words, a wind turbine is in itself a network of nuts

[26] *Problematisation*: What is the problem that needs to be solved? During this phase, the primary actor tries to establish itself as an obligatory passage point between the other actors and the network, so that it becomes indispensable.
Interessement: a series of processes by which the actor seek to lock the other actors (those who are not yet enrolled) into certain predefined roles.
Enrolment: a set of strategies in which the actor seeks to define and interrelate the various roles he has allocated to others. In this phase, the actors accept the roles that have been defined for them during *Interessement*.
Mobilisation: a set of methods used by the actor to ensure that supposed spokespersons for various relevant collectives are able to represent those collectives and not betrayed by the latter. Do the delegate actors in the network adequately represent the masses? If so, enrolment becomes active support. (Callon, 1986, p. 196).

and bolts, trial and error, research and development, politics and economy, but not all of these features are relevant for the construction of a wind farm. For that purpose, a wind turbine is an instrument for generating power and the other elements are therefore irrelevant.

The fact that the affected municipalities have approved only one of the four wind farms Havgul wants to build,, indicates that the translation process has not been successful. Problems have been defined, and two obligatory passage points have been constructed. Enrolment and enrolment attempts have emerged as a result of interessement, and this has in turn lead to counter enrolment by the opposition. However, the signs of mobilization have remained absent.

3.2.2 Heterogeneous Engineering

Actor network theory was first developed by Callon (1980), and in addition to him, the theory is mostly associated with the works of Madeleine Akrich, Bruno Latour and John Law. Unlike the technological system approach, ANT is by no means a uniform theory. Although it is called a 'theory', ANT does not usually explain *why* a network takes the form that it does. It is much more interested in exploring *how* actor-networks are shaped, how they are held together- or fall apart. It should therefore be regarded more as a methodological toolkit rather than a complete theoretical parcel. One could argue, however, that ANT represents an attempt to find a neutral vocabulary to describe the actions of those who have since been called *heterogeneous engineers* (Law, 1987). [27] Heterogeneous engineers build messy networks that combine technical, social, and economic elements. This sort of engineering involves associating indifferent or hostile elements to a self-sustaining network. Thus, conflict is

[27] The concept of heterogeneous engineering roughly resembles Callon's concept of engineer-sociologists (1987). However, I find that the concept of heterogeneous engineering better captures process of heterogeneous system building. I will therefore not go into any more detail about Callon's concept. See also Callon (1986), Latour (1988), and Law & Callon (1992) for examples of case studies using the ANT approach to heterogeneous system building.

regarded as an inevitable part of the construction process as networks are built in constant conflict between different networks or network components. Success is dependent on whether or not some of the more durable components have the power to stabilize the structure of the network when faced with forces that seek to decompose it.

An actor-network consists of a wide range of heterogeneous components that are tied together for a certain amount of time. However, the network is neither stable nor predictable. The elements in the network can at any moment redefine their identities and their mutual relationship in a new way, become dissidents, or bring new elements into the network.[28] Maintaining a well functioning actor-network is thus a continuous process of negotiation and translation. The emphasis on constant conflict implies that the heterogeneous engineers have to play an equally active part throughout the lifetime of the network. Hence, ANT is not a classical theory of power based on class struggles or gender issues, but rather a theory about how these struggles are acted out in practice.[29]

To a first approximation, ANT has much in common with Hughes' version of system theory. However, unlike Hughes, Law and his collaborators stress that the elements (including the heterogeneous engineers) bound together in networks are, at the same time, constituted and shaped in those networks. This means that they avoid making assumptions about a backcloth of economic, social, or technical forces: the backcloth is something that is itself built in the course of building a network (Bijker & Law, 1991).

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[28] The problem with dissidents is described in Callon (1986, pp. 219-221).

[29] Because it emphasis conflict and betrayal, ANT has been criticised for being warlike, and the heterogeneous engineers Machiavellian soldiers. The ANT scholars themselves have largely acknowledged this criticism of ANT and have taken a step away from the Machiavellian approach that they have been accused of supporting (Law & Hassard, 1999). However, despite some criticism from feminist scholars like Susan Leigh Star (2001), there has never truly been a confrontation with this part of the approach.

3.3 Combining System and Practice: Bringing in the Environment

In order to provide an answer to why the Norwegian energy system has had difficulties with incorporating the wind power system, I find it useful to combine the technological system approach with the practice oriented ANT. This is because I need a vocabulary to analyze the exogenous actors that has become important in defining the scope of action that was created by the problems the system encountered. I will therefore use the concepts from ANT to investigate how the different actors try to construct and deconstruct the actor-network in the Havsul projects. However, this is not to say that these actors could not have been included also in a system analysis of the conflict. On the contrary, as Hughes notes, "over time, technological systems manage increasingly to incorporate environment into the system, thereby eliminating the sources of uncertainty "(1987, p. 53). However, the way I see it, the system approach does not have suitable concepts to analyze ongoing controversies on technological change where the environment is not under the system's control. In retrospect, controversies can be analyzed in system terms, but the analysis of an ongoing controversy calls for a more practice orientated approach.

Furthermore, I will argue that this construction process is interrelated to, not only other networks, but also other technological systems. The wind power system is a subsystem of the Norwegian energy system. Hence, it consists of interlocking components like legislative artefacts, expert systems, organizations, consumers, and other energy producers. Some of these components, like for example the expert system, strongly affect the construction of the actor-network, and could therefore be regarded as systems rather than actors. However, the construction process cannot be understood by analyzing the relation between the different system components and the interrelating technological systems (or subsystems) alone. On the contrary, other actors like protest groups, environmentalists, and sea birds have to be included into the analysis. The construction of the Havsul actor-network

should therefore be seen as both the work of the involved actors, and the interlocking technological systems.

These two approaches will serve as the main part of theoretical framework. By using these theories, I will try to 'open up' the controversy and explain how and why a scope of action has been created that allowed exogenous actors to influence the political process. I will also use adjoining theory throughout the thesis to illuminate my findings in the analysis – especially in the part where I discuss the role of the expert system. Here, I will draw on theories on expertise and governmentality to explain how the uses of technoscientific quantification in the impact assessment study enabled some areas of nature to become political, and others not.

4 Methodology

This thesis is about the actors who have been involved in the controversy on the Havsul projects, and the strategies they have used to gain influence over the licence application procedure. My research focus and methodological approach is inspired by the underlying methodological and theoretical principles of *ANT*.

The ANT approach is influenced by the methodological principles of ethnomethodology, and can in some sense be regarded as just a way of doing ethnomethodology rather than a theory, "Actors know what they do and we have to learn from them not only what they do, but how and why they do it" (Latour, 1999, p. 19). The approach therefore stresses the importance of thick description and qualitative research.[30] Moreover, it is a method to learn from the actors without imposing on them a-priori definitions or theories (ibid). In other words, an *inductive* ideal is assumed.

4.1 Empirical Foundation

Drawing from the methodological framework of ANT, I started out by mapping the actors involved in the controversy. Before I created any research question or working hypotheses, I wanted to get an overview of the actors, their arguments, and the central areas of conflict. This pre-investigation was done by studying newspaper articles, readers' letters, the impact assessment report, hearing statements, relevant websites, as well as by looking up studies done on similar projects. Thereby, I was able to formulate a semi-structured interview guide with relevant questions that were based on the knowledge I had obtained.

[30] The term "thick description" is often affiliated with the anthropologist Clifford Gertz (1973). The purpose of "thick desctription" he argues, is to explain the context of the practices and discourse that take place within a society, such that these practices become meaningful to an 'outsider'.

The empirical foundation of the thesis is based on eight interviews and text analysis of relevant websites, newspaper articles, the licence application, the impact assessment reports, relevant legislation, and hearing statements. The interviewees were picked out based on my findings in the pre-investigation where I made a list of what I regarded as the most tone setting actors. From this list, I selected the interviewees based on the criterion that I wanted interviewees from both the opposition, and the supporter side. I therefore interviewed one representative from each of the following organizations: Havgul AS, Zero, the Norwegian Wind Energy Association, Friends of the Earth Norway (FoEN), the Norwegian Hospitality Association (RBL), and the protest organization "Stopp raseringen av kysten" (SRAK). Roughly speaking, one could say that while the first three of these organizations support the Havsul projects in particular, and the expansion of wind power in general, the latter three oppose it. In addition, I interviewed two representatives from the political side of this conflict: one representative from the Norwegian Water and Energy Directorate (NVE), as well as the Chairman of the Standing Committee on Energy and the Environment in the Norwegian Parliament. [31]

This selection provided me with a rich material that enabled me to tell the story about the Havsul projects from the angle of several of the central actors in this conflict. Moreover, because I have also included actors that are a part of the system's environment, and not only representatives from the system component, the analysis of this conflict has become different than what it would have been if I had used the system approach exclusively. The inevitable question is whether the findings would have been significantly different with another selection of interviewees. This is a difficult question, but as far as I can see, the selection of interviewees that I have used as my empirical basis is representative in the sense that they represent what I see as the most important aspects of the debate on wind power. Despite the

[31] See appendix II for a complete list of interviewees.

fact that I had intended to use these interviewees for further ‘snowball sampling’, this did not become necessary (Robson, 2002, p. 265-266).

5 Analysis: Enrolling Nature

The Havsul projects are controversial for several reasons, some more obvious than others. However, what seems to be at stake here is the conceptualisation of nature. Nature is the underlying concern in all areas of the debate. Politics, economy, environmentalism, electricity, and even the well-being of the townspeople are discussed from the standpoint of a certain definition of nature. Each definition of nature is itself a network, and contains scientific, technological, economic, and cultural value components. The struggle to define nature has therefore become a decisive battle for all the actors that are involved in this conflict. Hence, the heterogeneous system building in the Havsul projects has to be concerned with defining nature. In other words, in order to create a functioning actor-network, the heterogeneous engineers have to work on the definition of nature, and make sure that the hostile definitions are rendered harmless and are incorporated into the actor-network. This system building is also dependent on the interlocking system components of the Norwegian energy system, because these components can bee seen as powerful actors and delivers a large part of the premises of the debate. Moreover, as this case study shows, the opposition's ability to question these components was a crucial part of their success.

In the following analysis, I will argue that four conceptions of nature, and their relation to technoscience and politics, capture the central arguments and conflict lines in the debate: global concerns vs. local practices, natural resource vs. aesthetic product, conservationism vs. environmentalism, and technoscience vs. values.[32] These conceptions depict the most important challenges for the construction of a functional actor-network. At the same time they illustrate how and why the opposition, effectively neutralized the arguments of several system components. However, the distinctions are not mutually

[32] I prefer to use the term technoscience instead of science and technology. It also captures the basic interrelatedness of society, science and technology. See Latour (1987: 174).

exclusive, they overlap and many arguments contain elements from multiple categories. Nevertheless, to some actors, the struggle to define nature is based on the premise of either/ or, rather than co-existence. In other words, nature is defined from the standpoint of absolutism. Thus, the challenge for Havgul, is to form an apparent coherence from the chaotic heterogeneous bits and pieces and absolutist positions. Only then, can the wind power system be effectively incorporated into the Norwegian energy system. The question is therefore: What kind of nature do the actors use to justify their attitude towards Havsul? How do they relate to the other actors that are involved in the controversy? What kind of strategies has Havgul used to redefine and incorporate the hostile definitions? How did the opposition manage to undermine well-established system functions?

In the following chapters, I will give an answer to these questions by using both the ANT and the technological system approach, as well as adjoining theories. A large part of this analysis has the form of a discussion of the empirical findings. However, this discussion draws on the theoretical framework that serves as a red thread throughout the thesis. In addition, at the end of each of the four analysis chapters, I will sum up my findings by applying the theoretical framework explicitly to illuminate the empirical discussion.

5.1 Global Concerns vs. Local Practices

> The Havsul projects are not the solution to anything by themselves, but it is beyond any doubt that if you build hundreds of Havsul projects around the world… it will have an effect. No single action will save the world, but the sum of all the single actions can. Never before, has the saying "think globally, act locally" been truer than what it is now.[33]

Due to commitments laid down in the Kyoto protocol, Norway is obliged to reduce the emission of greenhouse gasses. In light of this, wind power as an alleged clean source of

[33] Inverview with Harald Dirdal, Havgul AS, 19.05.2006.

energy production has become an increasingly popular source of investment, not only in Norway, but also in countries like Sweden, Denmark, Germany, Scotland and many more. Hence, a central argument in the controversy on the Havsul projects has been that if one is going to solve the predicted "energy crisis" by increasing the local energy production, then this energy production has to be *environmentally sound.*

5.1.1 Global Climate Change and the Renewable Energy System

The focus on globate climate change entails a view of a global nature (Beck, 1992). The global nature argument reveals a powerful set of alliances. Along with the argument that the area needs new energy production, this is the argument that Havgul uses to legitimize an intervention in the local nature. The argument is strongly supported by environmentalist organizations like Bellona, Nature and Youth, and Zero. These groups all share the concerns about global warming, and see wind power as a means to avert these changes. In this view, wind power is perceived as not only a renewable source of energy, but is also considered to be environmentally friendly because wind turbines do not emit any greenhouse gasses. Moreover, they argue, Norway has some of the best wind resources in the world, and it is thus our duty to take advantage of these resources. The advocates of the global nature argument are concerned with the consequences of climate change, not only in Norway, but also on a global scale. Global warming, they argue, will affect the poor people the hardest. Fighting poverty and reducing the emission of green house gasses are therefore two sides of the same coin.

The argument of a global nature is closely linked to what could be labelled a global technological system for renewable energy production. This system draws its legitimacy from scientific arguments about the human made climate changes, and supports the expansion of renewable energy technologies like wind turbines, solar cells, hydrogen fuelled automobiles, and so on. In this sense, the idea of a global nature is largely created by technoscientific

arguments about global warming.[34] This view is advocated and given political legitimacy by among others, the International Panel on Climate Change (IPCC), and has been adopted by the Norwegian government.[35]

Havgul tie their project to this system explicitly by among others citing an article from Time Magazine about global warming on their web site.[36] The article is titled "Be worried. Be very worried" and starts of with a prediction of a self-inflicted dooms day for humankind: "No one can say exactly what it looks like when a planet takes ill, but it probably looks a lot like Earth. Never mind what you've heard about global warming as a slow-motion emergency that would take decades to play out. Suddenly and unexpectedly, the crisis is upon us."[37] By doing this, Havgul defined the problem that needs to be solved, and thereby turn the global concerns about global warming into the first obligatory passage point of the actor-network (Callon, 1986, pp. 205-206). The translation now reads: *If you want to fight global warming, support the expansion of wind power*. This translation is supported by the *enrolment* of a network of scientists, the IPCC, politicians, environmentalists (both locally and internationally), and its legitimacy largely draws from the definition power that the global technological system for renewable energy holds (pp. 211-217). In other words, Havgul's ability to define global warming as a problem in urgent need of solving derives from the use of well-established and powerful system arguments. The existence of the system of renewable energy technologies enables Havgul to enrol a strong network of scientists, politicians, and environmentalist, as these are already components of the system (Hughes, 1987).

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[34] See Asdal & Myklebust (1999, pp.35-37) for a description of how environmental politics became science based in Norway.
[35] The International Panel on Climate Change has concluded that the global emission of greenhouse gasses has to be reduced by 50-80% over the next 50 years in order to limit the global temperature increase to 2 degrees Celsius.
[36] Havgul: Global environment. http://www.havsul.no/Index.asp?Lang=Nor&Meny=3&Sub=97&id=179
[37] Ibid

5.1.2 Global Events and Local Consequences

The global nature is closely tied to the local nature in the sense that its consequences are local just as much as they are global. Climate change, affects poor and rich alike, the powerful and the weak indifferently, and it knows no boundaries (Beck, 1992, p. 36). Averting these changes is, as earlier mentioned, the most important basis of legitimacy for wind power in general, and the Havsul projects in particular. However, the rhetoric has also been used to justify the immediate consequences the projects will, or might have, on the local nature.

One potential consequence that has been given a lot of attention is the threat the wind turbines pose to the biological diversity in the area. The threat to the bird population has been debated heavily, and has forced both Nature and Youth and Zero to demand that a prerequisite for granting a licence to the Havsul projects has to be that the consequences for the bird population are tolerable. In a joint press release, they argue, "Norway has good conditions and an international responsibility for developing renewable energy… Nevertheless, we cannot have wind farms that threaten vulnerable bird populations."[38] In their mind, biological diversity and renewable energy technologies are both necessary components in the fight against global warming.

Havgul sees this a bit differently. They argue that due to the effects of global warming, the biological diversity in the area will disappear anyway. This is because increasing sea levels, temperatures, and salt content will make the fish disappear or move, and thereby forcing the seabirds to follow.[39] Hence, they argue that the threshold for taking risks should be lowered. In other words, the consideration for the biological diversity should not be put before the global problems that Havgul aims at fighting. On the contrary, the threat to the biological diversity is inevitable, and the Havsul projects could even contribute to slowing this

[38] Joint press release from Nature and Youth and Zero (26.04.2006).
http://www.nu.no/energi/alternativ/vindkraft/0ecc402eaa2852b7ac60bd489e74bbc1.html
[39] Havgul about local nature (Accessed 16.08.2006)
http://www.havsul.no/Index.asp?Lang=Nor&Meny=3&Sub=96&id=178

inevitability down. This argument is supported and given scientific credibility by a report Havgul ordered from the company Miljøfaglig Utredning AS. This gave Havgul the opportunity rank the global nature problem over the local nature in the hierarchy of consequences. Moreover, the scientific arguments about global warming and its consequence on local nature also made the whole concept of climate change less abstract and more intelligible. Thereby, they strengthened the legitimacy of the problem they have set out to solve - namely, global warming.

5.1.3 Reduced or Increased Consumption?

The advocates of wind power are not the only ones who support the fight against climate change. In fact, none of the actors who have been involved in the controversy have raised any doubts over the validity of these arguments. Thus, the argument is black boxed and taken as a given. However, the actors do disagree about the means to fight the defined problem. An underlying premise in the licence application is the need for increased production to meet the increased demands for energy. This premise is based on an acceptance of the 'energy crisis' argument. Møre and Romsdal needs new energy production and Havsul is a part of the solution to this crisis. In fact, according to Havgul, the Havsul projects are not only an alternative way of solving the crisis; they are an essential part of the solution. The energy deficit in the region will, according to the NVE, increase gradually and reach 12-14 TWh by 2010.[40] Havgul acknowledges that their projects will not be able ward off this crisis, but they argue that they can be a part of the long-term solution for the region: "in order to secure a stable, environmentally sound, power supply in the county for the future, there should be developed both large scale gas- and wind power. The combination of energy from water, wind

[40] NVE (2005) "Kraftbalanse i Norge mot 2020".

and gas will provide a robust and environmentally sound energy solution".[41] In fact, they argue, there is no way around the projects, because without 5 TWh of wind power one will not be able to avert the increasing energy deficit in the region. Thereby, Havgul have constructed *a second obligatory passage point*, and the translation now reads: *if you want to fight global warming, and avert an energy crisis in Møre and Romsdal by increasing the local energy production, support the Havsul projects* (Callon, 1986, pp. 205-206). In other words, Havgul attempts to become a part of *the Norwegian energy system* by making their projects an *indispensable* part of the solution to the second problem in need of solving; *the energy crisis*. This translation is supported by among others the enrolment of Tafjord Kraft AS who have invested in Havsul II AS, the Norwegian Government, and the NVE. Not all of these actors support the Havsul projects explicitly, but they have in various ways been advocates for the expansion of wind power in Norway.

However, not all actors accept the premise that there is a need for increased production: "We don't call it an energy crisis here in Friends of the Earth Norway (FoEN). In many ways, we have a consumption crisis. We are not capable of saying no to our own consumption - that's our crisis".[42] Based on this, FoEN in Møre and Romsdal have said no to the Havsul projects. According to them, a more acceptable solution to the predicted energy deficit would be to invest in energy saving technologies like heat pumps and wood pellets stoves. They also support the expansion of wind farms, but only if they are localized with sufficient care.

[41] Havgul. About the power situation in Møre and Romsdal and their vision of a solution: http://www.havsul.no/Index.asp?Lang=Nor&Meny=4&Sub=95&id=177 my translation.
[42] Interview with the director of Friends of the Earth Norway (Møre and Romsdal), Øystein Folden 22.05.2006.

5.1.4 An Inconsistent Global Nature?

At first, the townspeople of Møre and Romsdal were not aware of the problematic energy situation that is developing in the area, but as they learned what had caused it, their grounds for protesting were strengthened.

Several factors have contributed to the energy situation in the area, but the most important factor is the development of new energy intensive industry. Hydro Aluminium has expanded their aluminium factory in Sunndalsøra, the Hustad Marmor (Marble) factory is also going to expand their production, and last but not least, the development of the Ormen Lange project that will be ready in 2007-2008. Ormen Lange is a gas field that was discovered by Hydro in 1997. In order to exploit this gas, Hydro is now building processing plants, pipelines, subsea wells, and terminals. This project will need a large amount of electricity, and as their licence does not contain any clauses about the project being self-contained with electricity, they have to get it from the same grid as the one that is providing electricity to the households in the area.

Most of the gas from Ormen Lange will be exported to the UK. On their website, Hydro writes; "In October 2007, gas from the frozen arctic will be helping to keep 10 million Britons as warm as toast. That's when the giant Ormen Lange gas field in the Norwegian Sea comes on tap."[43] In other words, millions of Britons will benefit from Norwegian gas and thereby averting their own shortage of gas. At the same time, both Hydro and the Norwegian state make a fortune from selling the gas to the UK. Some of the gas from Ormen Lange is intended for the Norwegian market and local gas power plants, but that is only a marginal part of the total production. Thus, the Ormen Lange project leaves behind a giant net deficit of energy that needs to be filled by other sources of energy. This leaves the Havsul projects in a paradoxical position. The global nature argument implies that local concerns have to be set

[43] Hydro. "Ormen Lange in brief" (Accessed 18.08.2006)
http://www.hydro.com/en/our_business/oil_energy/new_projects/ormen_lange/index.html

aside for the sake of fighting climate change. However, at the same time, the electricity from Havsul would be used to extract and export gas to the UK were it will be used in gas power plants without CO2-cleansing. This political inconsistency has been picked up by SRAK:

> Why should we sacrifice our nature for this? Why should we sacrifice our living conditions, our quality of life, and our recreation areas? It is not our fault. The politicians are to blame. They have disclaimed their responsibility for years. They knew that by saying yes to Ormen Lange it would lead to a severe energy crisis in Møre and Romsdal…We don't want to sacrifice our coast in order to let them pump our gas over to the UK.[44]

Their answer to the energy crisis is that new gas power plants should be developed instead of solving the crisis with wind power. The imposed official requirement for complete CO2-cleansing is shaken off by referring to the underlying inconsistency in Norwegian politics;

> The Norwegian Government is willing to pump the gas from Ormen Lange to the UK where it is used without CO2-cleansing. Then we have to be consistent. It would maybe help if anyone had been consistent, but instead there is an unprecedented set of double standards.… Ormen Lange could have covered the total Norwegian energy demand, but instead it is sent out of the country. We are so sanctimonious that we cannot use the gas without CO2-cleansing, but in the UK, they do, and it is the same global warming.[45]

The problem with climate change, they argue, should not be solved by destroying the Norwegian coastline. The political answer to this issue is Domestic Tradable Quotas for the emission of greenhouse gasses, and not the expansion of wind power.

However, SRAK also incorporate renewable energy technologies like bio-energy, and energy saving technologies like heat pumps and wood pellets stoves in their alternative solution to the energy crisis. They also support wind power, but only if the wind farms are placed at least 50 kilometres offshore. Thereby, SRAK responds to the global nature argument

[44] Interview with Torill Molnes from SRAK 13.06.2006.
[45] Ibid.

by stating that not only are they worried about global warming, they are also willing to take their part of a global responsibility by supporting renewable energy. However, wind power in general, and the Havsul projects in particular, do not fit their definition of renewable energy.

This criticism is primarily political, and the problem with inconsistency has to be addressed by politicians rather than by Havgul.[46] However, because it undermines the underpinning system logic, this also causes a problem for the legitimacy of the Havsul projects. How can Havgul legitimize a large-scale intervention in the local nature based on an argument about global nature when this argument has proven to be deeply inconsistent? How can they maintain a moral high ground when it is obvious that the political inconsistency makes the global nature argument seem pointless? So far, Havgul's strategy has been to ignore the problem. It is simply out of their hands. Instead, they have continued to argue in favour of the Havsul projects based on the global nature argument. However, this argument has also been supplemented with a focus on the positive aspects of the projects, namely the economic benefits, and an attempt to undermine the criticisms of the projects' effect on the local nature and the local inhabitants by the enrolment of technoscientific expertise.

5.1.5 Local Nature and Local Practices: Enforcing Social Order

Bringing the global nature into the local nature has been a way for Havgul to give primacy to global concerns over local concerns. While the townspeople see the projects as a threat to their way of life, Havgul sees them as a part of our global responsibility. The local nature is closely related to local practices and traditional values; values concerning a traditional way of life and a way of being a part of nature.

[46] This criticism is related to what Dorothy Nelkin (1992) describes as a conflict between individual rights and social goals.

According to the anthropologist Mary Douglas, humans impose order on their environment through classification (1991). An anomaly in a system of classification invokes a concept of pollutions because the individual or the collective does not know how to classify it. Hence, when the townspeople reacted with animosity after having seen the animation of the plans, this can be understood as a sign of a failure to include wind turbines into their classification of the local nature. As Douglas notes, we all react with hostility towards something that is seen as a threat to the individual or the society. We react to "matter out of place", and ideas about pollution are used as means of enforcing social order. In other words, the "social uses of the environment as a weapon of mutual coercion" (Douglas, 1975, p. 5). Thus, for the townspeople, it was not only the physical nature in Møre and Romsdal that was at risk, but also their idea of nature. The order that they have made, has now come under threat.

The local nature argument is therefore an attempt to protect the townspeople's right to co-exist with their classification of nature, and not a classical environmentalist argument. They see their way of life as threatened, and want to enforce social order by protesting against the projects. If social order is not enforced, and the wind farms are built, they fear that the result will be depopulation, and that their sons and daughters choose to settle down elsewhere instead of carrying on the traditional way of life.

The local nature argument is first and foremost carried by SRAK, and deals with topics like the fear of risk, local practices, visual pollution and economy.

Global nature interfering with local practices. (Courtesy of “Stopp Raseringen av Kysten”).

5.1.6 Local Practices and the Fear of Risks

In an interview with the Norwegian newspaper Nationen, Torill Molnes said this about the intention of SRAK;

> I want to be the people’s spokesperson, and not think about cultural monuments or birds. Some people emphasize that sea eagles are being beaten to death by the windmills, or that they want to preserve graveyards that have laid dead for thousands of years. But what about the local communities today? Giske is a municipality in growth and needs no wind farm - or industrial area, which it should rather be called.[47]

In other words, the organization differs from the environmentalist organizations in the sense that they aim at protecting the interests of the local community in a broad sense. They are protecting their way of life and their traditional values.

[47] Nationen 06.02.2006. “Til aksjon mot vindmøller”.

The notion of a local nature is closely linked to local practices like fishing, boating, hunting, scuba diving, outdoor life, and recreation. While the first four of these activities might be constrained by physical obstacles and risks related to the wind turbines, the latter two are affected by what SRAK refers to as *visual pollution*. The plan areas, they argue, contain valuable fishing and diving resorts, and if the Havsul projects were carried out, these resorts would be ruined because of the restrictions that would be imposed on public traffic inside the wind farms. Havgul, however, argues that there will be no such restrictions on public traffic, but this is not good enough for SRAK; "They say that these wind farms are going to be open for public traffic, but they will never be open. The wind farms are going to be closed. We have seen enough accidents with windmills lately that tell us that it could become dangerous to move around inside of them".[48]

The immediate risks the wind turbines pose to activities inside the wind farms are according to SRAK; ice throws, noise, and engine breakdowns. Each one of these risks, they argue, poses too big of a threat to let anyone pass through, and let alone fish or swim there. Thus, they fear that the projects will interfere with, or put an end to traditional local practices.[49]

According to SRAK, the wind farms will also affect the people who live in the proximity of the area both directly and indirectly. The reason why people have chosen to settle down in this area, they argue, is the beautiful, wild, and *untouched nature*. Moreover, for the people who live in the affected area, this nature also has an important recreational function. Hence, if the wind farms were built this close to their entrance doors, it would ruin the very reason why they chose to settle down there in the first place. Torill Molnes puts it this way; "They are taking away our view of the ocean. Who owns the view of the ocean? Is it Havgul? We feel that they cannot just come here and plant the world's largest industrial area

[48] Interview with Torill Molnes from SRAK 13.06.2006.
[49] See Nelkin (1992) for case studies regarding the conflict between economic interests and the controlling of health risks.

just in front of us and our sunset, and our ocean. It is our horizon, and it cannot be bought for money".[50] In other words, what is at stake here is the scenery - *the aesthetic nature*. SRAK calls this *visual pollution*, and thereby they add new meaning to the concept of pollution. The classical definition of pollution is "the release of chemical, physical, biological or radioactive contaminants to the environment"[51]. Thus, by using the concept of visual pollution, SRAK tries to add aesthetics as a connotation to the classical environmentalist concept of pollution. This concept is not only tied to the visibility from the affected houses, but also to the outdoor life. Wind farms, they argue, do not belong in the untouched nature that is found in this area. A wind farm would ruin the recreational aspect of outdoor life by polluting the scenery. Havgul and environmentalist organizations like Zero and Nature and Youth have met this criticism by arguing that only a few houses will affected by the wind farms. Moreover, because the wind turbines are placed off-shore with the wind turbines placed between 3 and 11 kilometres away from the nearest populated areas, the visual effect will be limited. Hence, they argue, that the visual consequences of the projects should not be taken into account: "global concerns are more important than local aesthetics".[52]

5.1.7 System Inconsistency and the Path Dependent Pattern of Growth

Bringing the global nature into the local has been a powerful tool for Havgul to legitimize large-scale interventions into the local nature. Bellona, Zero, and Nature and Youth have also used the same argument in their attempts to expand and incorporate wind power into the Norwegian energy system, and they have therefore been an important source of support for Havgul. Moreover, when Havgul constructed the two obligatory passage points (global warming, energy shortage), they did this by drawing from the logic of two different, but at the same time interdependent, technological systems. By defining wind power as an indispensable

[50] Ibid.
[51] Wikipedia (Accessed 20.08.2006)
[52] Interview with Tine Larsen, Zero, 29.05.2006.

means for solving these problems, they set out to frame the issue in such a way that their opponents' problem-definition would be rendered irrelevant. While the first obligatory passage point draws its power from the global technological system for renewable energy production, the second draws from the existing Norwegian energy system. However, with varying success, the opponents have challenged these system arguments.

The inconsistency of the Norwegian energy politics, which allowed Hydro to build Ormen Lange and expand their production in Sunndalsøra effectively undermined the credibility of the first passage point. As SRAK argued, the argument about global warming simply makes no sense when what has caused the energy crisis obviously does not consider global concerns. Hence, what was intended to be a sign of global concerns and local responsibility, has now been turned into a debate on justice and the infringement of individual and local rights.[53] In other words, the view that this is an example of the "Not in my backyard" mentality, should be questioned. That is not to say that the classical problem of individual rationality and collective irrationality does not come into play also here.[54] However, what SRAK has managed to do, is to describe the collective as both irrational and inconsistent, and thereby they have undermined the global nature argument. Thus, once this argument was gone, it was possible for other actors than Havgul to define the problems at stake. This enabled SRAK to argue that what is at stake here is their way of being a part of nature, their traditional practices, and economic values - not climate change.

The second obligatory passage point relies on the underlying premise that increased energy production is an inevitable part of the national energy system. Several of the system components in the Norwegian energy system depend on a continued growth in the

[53] See Nelkin (1992) for similar argument.
[54] "Not in my backyard" describes a phenomenon in which residents oppose a development as inappropriate for their local area, but by implication do not oppose such development in another's. The same logic is found in game theory where among others the famous prisoner's dilemma game illustrates how individual rationality leads to collective rationality. The central problem for rational choice theorists is therefore to describe the existence of the collective. This problem has for example been illustrated with what has been called the tragedy of the commons. See Elster (1989).

national energy production. The most important components in this sense are the consumers, the power demanding industry, and the Nordic energy market (Nord Pool). In addition, due to the poor grid conditions in this part of Norway, it is not possible to solve the situation in Møre and Romsdal with imported electricity. Thus, if the consumption is not decreased the area will need new local energy production. This system logic seems to be difficult to reverse, and one could in some sense say that the system has a *path dependent* action pattern where continued growth is the only solution (Wicken, 2005). This is so, because there are simply too many of the system components that rely on increased energy production and cheap electricity for either maintaining their competitive advantages, or just for upholding the same living standards. Hence, when the FoEN tried to argue in favour of decreasing the consumption, this point did not get any attention. Instead, increased production remained the underlying premise throughout the debate, despite the fact that so far no solution to the energy crisis has been proposed.

5.2 Natural Resource vs. Aesthetic Product: The Profitable Nature

Throughout history, men have looked to nature for food harvesting and other ways of making a living – and a profit - from natural resources. It is therefore no surprise that this is also the case in Møre and Romsdal. The controversy on the Havsul projects has revealed several rivalling interests that are all related to a moneymaking nature. Havgul wants to convert the wind into a profitable natural resource, the municipalities are offered a compensation for the confiscation of the areas, the tourist industry uses the nature to market the region, the local anglers make a living of the local fish, and the townspeople's house prices are dependent on untouched nature. In other words, in this conflict, nature is more than just aesthetics, a source for recreation, local practices, and a source for concern. It is also a profitable resource. Due to the scope of this dissertation, I will not go into details on all aspects of these topics. Instead, I will focus on the three areas that have been most prominent, namely wind power and the green certificates debate, the promised benefits for the municipalities: increased employment and a compensation for the confiscation of the sea areas, and finally the tourist industry.

5.2.1 Profiting From a Natural Resource: The Notion of "Green" Energy

When Havgul decided to send their licence application, this was largely due to a political promise that in 2006, the Norwegian government would introduce a market for trading green certificates. The underlying premise behind the proposal was the need for improved and stable political and economic conditions for the production of renewable energy. Despite the fact that there were some discussions about what should be regarded as "green energy", there were never any doubt that wind power should be included in this definition. With this scheme, wind power would no longer be an unprofitable form of energy production. On the contrary, because the scheme would ensure the demand of the electricity, wind power would become

profitable. This was the reason why so many companies invested in wind power projects after the parliament had indicated that they would introduce this scheme. However, as earlier mentioned, the attempts to establish a common scheme of green energy certificates stranded in 2006 after Norway and Sweden had failed to reach an agreement in the negotiations. The Norwegian Minister of Petroleum and Energy, stated that the decision to end negotiations was made because the proposed system would have become "too expensive for the Norwegian consumers and the industry".[55] Instead, the Government wanted to strengthen the focus on already established instruments, and promised to come up with an alternative scheme that would be even better than the one they had just abandoned.

The termination of the process was met with heated protests from energy suppliers, environmental organizations and the parliamentary opposition. Havgul was one of those criticizing this decision. "In reality, a stop in the introduction of green certificates will also mean a temporary stop in the development of all the planned projects for renewable energy until an alternative scheme is presented".[56] The alternative scheme has not yet been fully introduced, but in June this year, it was announced that the Government would allocate NOK 20 billion in a fund in order to strengthen the efforts to increase production and use of renewable energy, and increased energy efficiency. The yield is estimated to be about NOK 800 million annually, and will be managed by the state owned agency Enova.[57] The Government will include wind power also in this scheme.

It is still too early to say whether this will be sufficient to attract investors to any of the Havsul projects if a licence is granted. However, the political handling of this issue has created uncertainties as to whether or not wind power is actually a prioritized political area.

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[55] Press release from the Norwegian Ministry of Petroleum and Energy (27.02.2006) http://odin.dep.no/oed/english/news/press_releases/026021-070204/dok-bu.html

[56] Press release from Havgul (Accessed 28.08.2006) http://www.havsul.no/Index.asp?Lang=Nor&Meny=&Sub=&id=61&nid=26

[57] Press release from the Norwegian Ministry of Petroleum and Energy (14.06.2006): http://odin.dep.no/oed/english/news/press_releases/026021-070222/dok-bn.html

One could therefore argue that if Havgul's global nature argument has any political and economic support from the Norwegian Government, this support is at best blurry.

Despite an apparent all-party agreement on the green certificate scheme, the proposal also had its opponents.[58] SRAK were among those who opposed it: "The expectations to the green certificate scheme created a commercial interest for windmills. The companies now saw that they could make money out of this, and the queue of adjoining projects will only cause a large environmental conflict".[59] In other words, they saw the establishing of a scheme that was aimed at supporting the interest of society as a threat to their individual and collective rights (Nelkin, 1992). FoEN has also largely supported this argument. Inherent in the proposed scheme, they argue, was a strong stimulation for the development of, among others, small hydro power plants that could threaten the biological diversity. However, the organization wants a new scheme that provides predictable conditions for the development of renewable energy sources, but at the same time gives more consideration to factors like biological diversity.[60] The RBL has also criticised the scheme, but on different grounds than SRAK and FoEN. Their main objection is that such a scheme would threaten the tourist industry, because it would imply a massive expansion of wind farms on the Norwegian coastline. In other words, what SRAK, FoEN, and RBL are saying, is that giving political priority to the development of wind power, would cause the different conceptions of nature to collide.[61]

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[58] The present coalition Government originally supported the green certificate scheme. This was even laid down in the Soria Moria declaration, which is the platform of the red-green Government. However, they later abandoned the scheme after the negotiations with the Swedish delegation stranded in February this year.
[59] Interview with Torill Molnes from the SRAK 13.06.2006.
[60] Interview with the director of Friends of the Earth Norway (Møre and Romsdal), Øystein Folden 22.05.2006.
[61] The conflict between individual rights and social goals is a constantly recurring issue in the political debate. This has also been described in the controversy literature. See for example Nelkin (1992).

5.2.2 The Logic of Compensation: A Choice Between Money and Nature?

> It is an illusion that municipal welfare is independent of jobs, tax revenues, and business activity. The Havsul projects will strengthen the municipal welfare in the five municipalities through increased business activity and new and exciting jobs, and contribute to replace depopulation with establishment and regional optimism.[62]

Apart from benefiting from increased energy production, the affected municipalities have also been promised both increased employment and an economic compensation for the confiscation of the sea areas. The latter promise came about after negotiations between Havgul and the affected municipalities. The compensation agreement, or natural resource taxation, is built on the same model, as the one that has been used in waterpower development. The compensation is an alternative to property tax, which the municipalities stand freely to impose at any time. Hence, in order to ensure economic predictability, Havgul chose to offer the municipalities this compensation.

The total investment cost for Havsul I, II, and IV, has been estimated to NOK 17 billion. Havgul AS carries all development costs that accrue until the licences are granted. The project will then be sold to investment companies who will operate the wind farms. These companies will then have to pay an annual compensation fee to the affected municipalities: The municipality of Sandøy (Havsul I), has been offered an annual compensation of 5/1000 of the wind farm's cost price for the next 10 years (approximately NOK 17 million). The municipalities of Giske and Haram (Havsul II) have been offered an annual compensation of respectively NOK 19.5 and 20.5 million. Finally, the municipalities of Eide and Averøy (Havsul IV) have been offered an annual compensation of 5/1000 of the wind farm's cost price (approximately NOK 11.2 and 5.7 million).

In addition to the annual compensation, Havgul argues that the projects will generate a significant number of jobs in the affected municipalities. This will be especially notable

[62] From the Havsul website: http://www.havsul.no/Index.asp?Lang=Nor&Meny=4&Sub=93&id=175

during the construction phase, but it will also be an important contribution to the employment situation during the operation phase. According to Havgul, the number of jobs that are directly related to the projects during the construction phase will be approximately 3400. In addition, the number of indirect man-labour year (secondary and tertiary effects), will be three or four times that. During the operation phase, the projects will employ approximately 50-60 people, and in addition to this, there will be some secondary and tertiary effects.[63]

The compensation fee and the creation of new jobs are arguments that weigh heavily for local politicians who are struggling with an already overextended municipal economy. Hence, faced with an opportunity to improve local welfare on the one hand, and local protests on the other, the local politicians have been placed in a no win situation between competing interests. Drawing from the theory of translation, one could in some sense say that the contributions to the municipal economies constitute a third obligatory passage point (Callon, 1986, pp. 205-206). Not only does Havgul set out to solve the problem of climate change and energy deficit in Møre and Romsdal, but also to ensure the municipal economies. However, this would probably be to take it one step too far. Despite the fact that Havgul identifies this as a problem in need of solving, they do not set out to solve it by themselves. Nevertheless, for the many local politicians, the Havsul projects are a welcomed help in their economic struggles. Hence, a handful of local politicians have become spokespersons for the projects. A good example of this is the mayors of Haram and Giske who have given their support on several occasions.[64] In other words, through a round of *interessement*, Havgul has *enrolled* and *mobilized* a handful of local politicians into the actor-network (Callon 1986, pp. 206-219). Despite the fact that the Havsul projects are meant to solve other problems than the local economies, these interests have become an integral part of the actor-network through the compensation agreement, and the contribution to the local employment.

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[63] Interview with Haral Dirdal, Havgul AS 19.05.2006.
[64] Sunnmørsposten (Accessed 03.09.2006) http://www.smp.no/default.asp?page=1024&item=561731,1&lang=1

5.2.3 With Nature as the Raw Material: The Tourist Industry

> A landscape polished smooth by the sea. Charming towns and friendly people. Wild mountains and green valleys. Deep fjords binding the sea and mountains together. Coastal culture and town culture and long, established traditions. Møre and Romsdal offers an adventure on many levels and it is all down to the rhythm of the sea.[65]

This quote is from a Norwegian tourist website called Go Norway, and gives a good picture of how the tourism industry in the area markets their product. An important priority for the industry is the Atlantic Ocean Road. These two pictures give a good illustration of how the industry wants to present the local nature to their customers from this road.[66]

"It is first and foremost our beautiful coastal nature the travellers come here to experience. Silence and ocean view that is what we are marketing. It is this magnificent nature

[65] The tourist website, Go Norway (Accessed 30.08.2006): http://www.gonorway.no/norway/county.php?ID=10
[66] With courtesy of Go Norway (Accessed 30.08.2006): http://www.gonorway.no/norway/sidevisning.php?id=161

that is the basis for development and growth within the tourist industry".[67] In other words, it is *the aesthetic nature* that is the raw material in the product that the industry wants to sell to the tourists. Thus, because tourist who visit Møre and Romsdal expect to see *wild and untouched nature*, the tourist industry fears the Havsul projects could cause a serious setback for both the established industry, and the future development of the industry in the area.

Havgul has responded to this criticism by arguing that the tourist industry is small in the area. Nevertheless, they argue, if the industry acts proactively towards these challenges they might even benefit from the projects. In the impact assessment study, they argue that the experiences from other wind farms show that if these projects have had any impact, the consequences for the tourist industry have been positive. In fact, places like Horns Rev in Denmark and Gotland in Sweden have even attracted more tourists after the wind farms were built. The reason for this is that they have managed to transform the wind farms into tourist attractions by, among others, establishing information centres. However, Havgul also acknowledges that it is difficult to predict what long term effects the projects will have on the tourist industry. This, they argue, depends on three factors. 1. How many wind power licences the authorities will grant in the coming years (cumulative effects). 2. To what extent the tourist industry manages to adjust in accordance with the changes the projects will bring. 3. How people's attitudes towards wind power changes over time.[68]

In the impact assessment study, Havgul argues that the consequences for the landscape, the cultural monuments, and the tourist industry will be smaller with large, compact wind farms than several small ones. Thus, considering this, the cumulative effects will be smaller on the area if Havsul, and none of the other projects that are planned in the area, are built. In the report, they have illustrated it like this:

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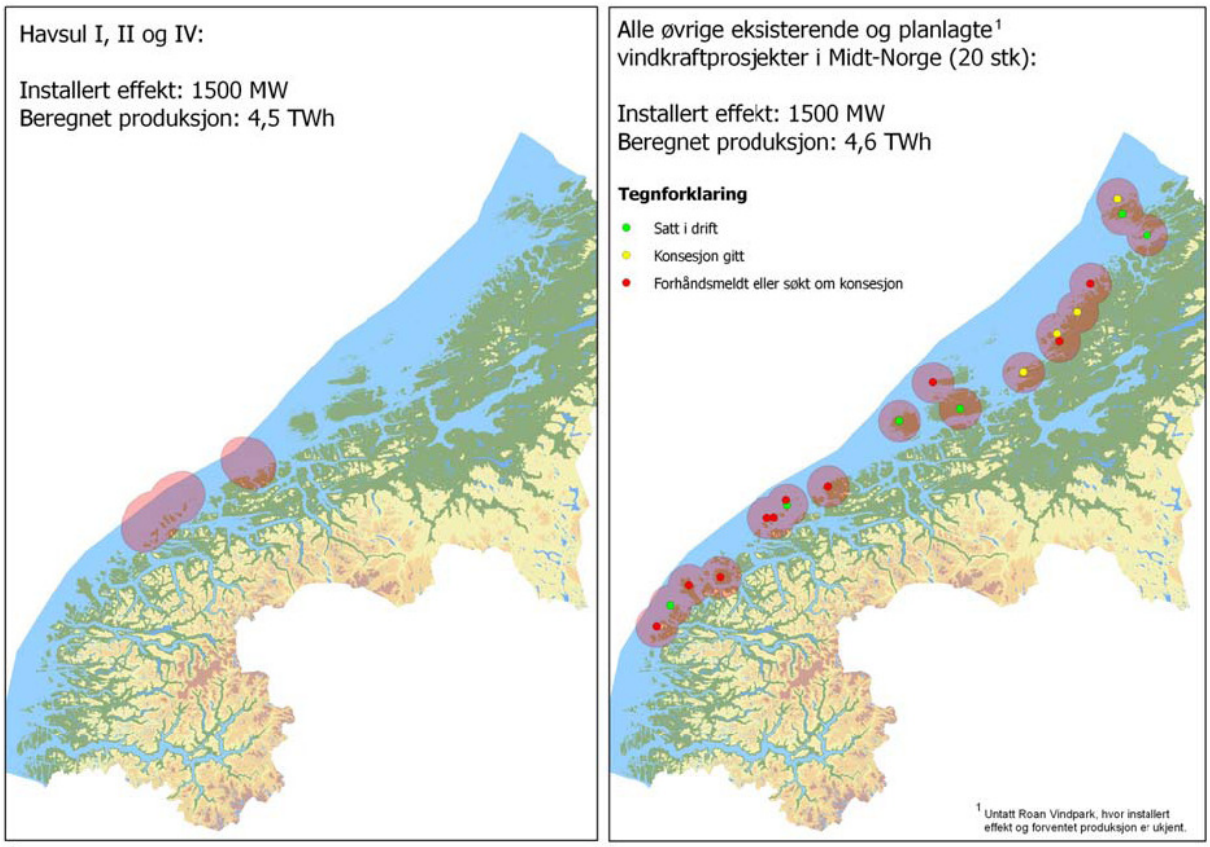
[67] Hearing statement from "Giske Reiselivsforum" (25.06.2006: 1).
[68] The impact assessment report for Havsul II (2006: 87)



On the left side: Only the Havsul projects. On the right side: All the existing and planned projects in the area.

The two latter factors, Havgul argue, can in reality benefit each other, because when the result of global warming becomes more visible, people will become more positive towards renewable energy sources like wind power. Hence, instead of seeing it as visual pollution, the combination of wind turbines and untouched nature will become a symbol of responsibility, and could in fact attract tourists to the area.

The industry's response to this (here represented by the RBL), has been that they do not oppose the expansion of wind power per se. Thus, they agree on the underlying premise in the cumulative effect argument. However, their support for wind power does not go further than demanding that the localisation of wind farms do not come in conflict with the interests of the tourist industry. Neither do they agree with the argument that the industry can actually benefit from the wind farms. The conditions, they argue, are different in Møre and Romsdal than in Denmark and the other examples Havgul uses. The products are not the same. None of

the places that are being used as examples, market themselves on *untouched nature*. Moreover, even though it might be true that some wind farms will become tourist attractions, this will only be a temporary effect, because as soon as wind farms become a familiar feature in the Norwegian nature, they will grow to be less exotic.

5.2.4 Political Uncertainty and Competing Economic Interests

Arguments about economic compensation and job creation have traditionally been weighty in conflicts over the development of waterpower and wind farms. However, the Havsul debate differs from for example the debate on the so far largest wind power project in Norway, the Smøla project, in the sense that the economic arguments have to a larger extent been questioned. Other values, like local practices and biological diversity, have become more important. At the same time, competing economic arguments, like the effect on the tourist industry, have gained attention.[69] In other words, the opposition to the Havsul projects has taken a different and stronger form than what has been the case earlier in similar wind power and waterpower projects. In some sense, one could say that the economic logic underpinning the application process has been questioned. However, this does not necessarily mean that the debate has become more value oriented. The economic argument has been questioned just as much by competing economic arguments like house prices and the effect on the tourist industry, as it has by traditional values.

Despite the fact that similar compensation agreements like the ones Havgul has entered into with the municipalities have been used in waterpower-cases for years, actors like SRAK and RBL have effectively questioned both the legitimacy and the credibility of the agreements. The agreements, they argue, are between Havgul and the municipalities, and do not include the companies that are actually going to operate the wind farms. Hence, no one

[69] See Bjørgen, Tollef G. (2005) for a case study of the Smøla project.

can actually guarantee that these agreements will be honoured. In a joint press release from Havgul and Tafjord Kraft (who together with Vestavind Kraft owns 50% of Havsul II), this criticism was countered by referring to Tafjord Kraft's history as an energy producer in the region: "It is common with this kind of agreements in our host municipalities. Tafjord Kraft has produced power ever since 1917. So far, we have not dishonoured a single agreement, and we have no intention of starting with that now".[70] In other words, what has been a part of the national energy system for years is now being challenged. The only difference here is the technology. Nevertheless, SRAK and the rest of the opposition have to some extent been successful in undermining the credibility of these agreements. This became especially clear during the days before the advisory referendum in the municipality of Giske. SRAK had then created a lot of noise in the local media both about the credibility, and about the legality of these agreements.[71] The outcome of the referendum was 75/ 25 % in favour of the opposition. It is difficult to say whether or not it was SRAK's strategy to discredit the compensation agreements alone that became the decisive factor for the outcome of the referendum. A more likely analysis is that the outcome was a result of the combination of the arguments that the opposition used to oppose the Havsul projects. However, seen from a system perspective, the fact that SRAK actually managed to neutralize, or raise question about, one of the primary system arguments, illustrates why it is so difficult to incorporate wind power into the energy system. The old system argument do not work because other actors than the system components have been allowed to decide how things should be.

Municipalities in Norway have traditionally welcomed energy projects because of their economic and employment benefits. However, as this conflict has revealed, the tourist industry has now become a strong competitor to the part of the energy system that demands

[70] Press release from Havgul and Tafjord Kraft 12.09.2006. "Avviser påstander om ugyldige avtaler" http://www.tafjord-kraft.no/content.asp?page=1804&item=22453,1&lang=1

[71] An example of this is an article in local newspaper Romsdal Budstikke from 16.09.2006: "Ingen penger for vindmøllene". http://www.rbnett.no/apps/pbcs.dll/article?AID=/20060916/LOKALNYTT/109160024/1010/CUPQUIZ

interventions in nature. Tourism is today a prioritized political area, and the Norwegian nature is their product. The industry stands for 4% of the gross domestic product, and with substantial political and economic support, the government hopes to expand the industry even further.[72] Thus, when the industry argued that the wind farms will put an end to all further investments in the region; the municipalities are placed in a position where the economic and employment benefits have to be weighed against each other. Should they say yes to the economic compensations from Havgul, or should they rely on an expanding tourist industry? For the municipalities that are affected by the Havsul projects, this position as been extremely uncomfortable because the interests of the tourist industry has not only been carried by the industry itself, but also by SRAK. Thereby they have established a strong alliance where the interests of the tourist industry are described as congruent with the interests of the townspeople. Moreover, because the tourist industry refers to untouched nature as the raw material in their product, they also share the interests of conservationist groups like FoEN and GWoN. I will return to this under my discussion of conservationism vs. environmentalism.

The green certificate scheme could have been a way for the Norwegian Parliament to show that the expansion and incorporation of wind power into the Norwegian energy system is a political ambition. However, the combination of the fact that scheme was cancelled, and all the confusion the alternative scheme has caused, has severely weakened the political incentives to further this development. In the wake of this, other actors and arguments have become important.

[72] The Norwegian Ministry of Trade and Industry. "Handlingsplan for reiselivsnæringene" (2005) http://odin.dep.no/filarkiv/253355/reiselivsplan2.pdf

5.3 Conservationism vs. Environmentalism

5.3.1 Preserving Untouched Nature

> Human beings need to see nature that is undefiled and untouched. We need to get away from the city and the everyday fussing and stress, and be able to rest our eye on untouched nature. To see the sea eagle and the seagulls sail into the sunset. It might sound romantic, but it is correct. It has been scientifically proven that we need this for our physical well-being, and be able to call ourselves human beings. We are not so far from nature that many seem to think, that we can lose all nature, and still be human beings.[73]

In the debate on the Havsul projects, the word untouched has been used frequently to describe a certain type of nature that is worth preserving. Both SRAK and the RBL have used the word to legitimize their definition of nature (local and profitable), but GWoN and FoEN have carried the environmentalist side of it. However, despite the fact that these two conservationist groups share the belief in the notion of untouched nature, their opinions differ in many other respects.

If the statement from the leader of GWoN, Kurt Oddekalv, which I quoted above, is to be taken seriously, it entails a division between nature and culture that resembles the antiquity's romantic view of nature where society was thought out of nature as an *ontological necessity*. [74] In this view, nature becomes the true origins of human beings, something that we can return to for recreational purposes. Moreover, not only is this a possibility, something that we can choose to do, but the need to do so is also a scientific fact. Hence, by putting up wind turbines in what they regard as untouched nature, they argue that we lose a part of our identity

[73] Kurt Oddekalv, leader of Green Warriors of Norway, in a video appeal on their website. My translation. (Accessed 21.08.2006).
http://www.miljovernforbundet.no/render.asp?session=&articleno=545&segment=1

[74] The romantic nature can be traced back to the mythological stories from the antiquity, about an external nature that is having its effect on society. In part, during the Romanticism Period, it was also a revolt against aristocratic social and political norms of the Enlightenment Period and a reaction against the rationalization of nature. The romantic nature is also present in contemporary works on ethics. Many critics will for example argue that Hans Jonas' (1984) confrontation with the Baconian vision of science should be interpreted as a defence of what I here call the romantic nature.

- the part that makes us human beings. Like FoEN, neither do GWoN accept the premise of a need for increased energy production. Moreover, they argue that there is no need for further expansion of wind power in Norway. "We have filled Governments goal of 3 TWh wind power and 4 TWh of renewable energy. The goal is already reached. There is no need for any more wind power development in Norway…. the mills are ugly, they ruin the aesthetics, and they are constantly in motion".[75]

FoEN is not as programmatic in their statements as is the case with GWoN. However, they share the emphasis on untouched nature as something that is in need of preservation, and see the Havsul projects as a threat to important parts of the Norwegian nature. Wind, they argue, can be a positive source for energy production. However, this is only the case if the wind farms are localised in areas where they do not ruin untouched nature: "Wind is renewable, but the localisations of wind farms are not necessarily renewable. Just as it is with hydro-electric power stations - the water is renewable, but there is nothing renewable about removing the water from the river". [76]

The conservationist view of nature, which both FoEN and GWoN are advocating, has many similarities with what Kate Soper (1996) calls the ecology discourse. In the article, "Nature/'nature'", Soper criticizes this discourse for portraying the nature-society relations as dualistic. This dualistic view, she argues, "obscures the fact that much of the 'nature' which we are called upon to preserve or conserve... takes the form it does only in virtue of centuries of human activity" (pp. 23-24). In other words, if one is to follow the definition of nature put forth in the ecology discourse, it becomes clear that there is nothing natural about the 'nature' that we have been called upon to save. On the contrary, what the preservationists seek to conserve, is "the product of class, gender and racial relations" (ibid).

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[75] Ibid
[76] Interview with the director of Friends of the Earth Norway (Møre and Romsdal), Øystein Folden 22.05.2006.

The term untouched nature has also been frequently used by SRAK. However, their definition of untouched is closer tied to local practices and culture than the definition used by FoEN and GWoN. Hence, willingly or not, they do not fall into the ecology category where untouched nature is juxtaposed to a nature free of human activities. In their hearing statement, SRAK wrote this about untouched nature:

> One should here consider what nature really means. The direct meaning of it is of course an area that is unaffected by human interventions, but at the same time some interventions can be accepted without the notion of nature gets lost. Some lighthouses, boathouses, private buildings with local characteristics etc. do not usually have a large negative impact on the experience of nature. Antenna masts, chimneys, and other modern interventions seem to be more critical.[77]

Untouched nature is here juxtaposed to a cultivated nature. However, this cultivated nature is tied to traditions and thereby aesthetics, but it is not flexible in terms of incorporating new elements like for example wind turbines.

The cultivated nature view is also found in the concerns of the Directorate of Cultural Heritage. The Directorate has opposed the Havsul projects on the basis that it ruins historical monuments by destroying the scenery. None of these monuments will be affected physically (at least those that are located above sea level), but by taking away the scenery, the Directorate argues that the monuments will lose their cultural and historical value. This implies a static definition of nature where only a few human interventions in nature are regarded as an appropriate part of the aesthetic, untouched, and cultivated nature.

5.3.2 Biological Diversity: Birds vs. Wind Turbines

The term biological diversity was used in the impact assessment report to investigate what consequences the Havsul projects will have on both the local bird and fish population.

[77] SRAK's hearing statement (27.06.2006, p. 12)

Nevertheless, even though the report focuses on both the fish and the bird population, the debate has come to be mostly been centred on birds. This does however not imply that the consequences on the fish stock have not been debated. On the contrary, powerful actors like the Directorate of Fisheries in the region of Møre and Romsdal, the Norwegian Fishermen's Association, and the Norwegian Coastal Fishermen's Union have debated the issue extensively. However, this has mostly been done from the standpoint of commercial fisheries. Thus, the fish has only been given agency as a raw material for industrial fisheries, and not as an animal that is exposed to potential risks from the wind turbines. I will therefore concentrate my analysis on the birds since they have been given a strong agency throughout the debate.[78]

In order to understand why the birds have come to play such an important role in this controversy, it is necessary to widen the scope of the analysis and look at how the controversy on other wind farms, or interrelating subsystems, have had an effect on this conflict. "The wind park on Smøla is starting to become a catastrophe for the sea eagle", writes the Norwegian Ornithological Society[79], "The sea eagles are cut in half. These are killing machines for birds", says GWoN[80]. These are only two examples, but the fact is that after it became known that during the first eight months, the wind farm at Smøla had killed nine sea eagles, it attracted massive attention. Never before in the history of wind power had this occurred in such a large scale, and all of a sudden, the industry had gotten a new problem to deal with. The sea eagle population is not as big in the plan area for the Havsul projects as it is at Smøla. Thus, this particular bird has not received the same attention here as it did at Smøla. However, the attention has instead been turned towards other species like for example the Guillemot, the Northern Gannet and other sea birds.

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[78] The idea of giving the birds agency in this conflict is inspired by Callon's (1986) study of the domestication of scallops and the fishermen of St. Brieuc Bay. In this article, he argues that the scallops should be regarded as actors because they contribute to the construction of the actor-network.

[79] The Norwegian Ornithological Society (Accessed 24.08.2006).
http://www.birdlife.no/naturforvaltning/nyheter/?id=43

[80] Kurt Oddekalv, leader of Green Warriors of Norway, in a video appeal on their website. My translation. (Accessed 21.08.2006).
http://www.miljovernforbundet.no/render.asp?session=&articleno=545&segment=1

The bird problem illustrates how unforeseen foreign elements can challenge the shape of the technological "hardware" when a technological system (in this case the wind power system) is transferred from one location to another. This, Hughes argues, is "because a system usually has embodied in it characteristics suiting for survival in a particular time and place", thus, "manifold difficulties often arise in transfer at another time or to a different environment" (1987, p. 67). Because the birds' well being became the source of such large concerns for many of the parties in this conflict, several demands regarding the localization of the wind turbines were raised. These demands ranged from those who argue that the plans have to be stopped, to those who want Havgul to adjust their plans in such a way that they do not come into conflict with the birds.

The fear of collisions with the wind turbines is only one of the potential conflicts the projects might have on the birds. A more likely and credible consequence, is that the wind farms will deprive the birds of the areas where they seek food. This is because the projects are planned in the same shallow water areas that the birds use for seeking food, and which is a part of their migratory path. Hence, if the birds do not find alternative areas in the proximity, the result might be a reduction in the bird population.

Havgul acknowledges that the projects might come into conflict with the local bird population. They have even stated these consequences are their prime concern, exceeding both tourism and local concerns.[81] Thus, they have adjusted their plans in order to minimize the risk. They also want to do follow-up studies after the wind turbines are put up in order to see how the farms are affecting the birds, and thereby enable averting measures. In other words, the consequences for the bird population were the only ones that were decisive enough to force about a change in Havgul's plans. However, the measures Havgul has taken, do not satisfy actors like FoEN. FoEN argues that there is too little knowledge about what

[81] Sunnmørsposten (Accessed 23.08.2006): http://www.smp.no/default.asp?page=1024&item=568231,1&lang=1

consequences the wind farms will have on the bird population, and that this should be examined further before anything is built in this area. The precautionary principle should favour the birds, not Havgul. Havgul's response to this has been that due to global warming the biological diversity in the area will disappear anyway. Hence, the threshold for taking risks that might influence the biological diversity should be lowered. In other words, faced with two precautionary principles, Havgul and FoEN disagree on whether it is the local or the global considerations that should be the most important.

On this issue, Zero and Nature and Youth have taken a middle course. Along with a call for the authorities to do a better job at mapping the biodiversity in Norway, they have suggested that Havgul should put up test-mills in order to see how the birds react to foreign elements like wind turbines. If they do not react negatively towards these, Zero and Nature and Youth argue, then Havgul can gradually start to build their wind farms.

The fact the bird issue became so important in this conflict is largely due to limited knowledge about the localities of, and the size of the biological diversity in Norway. Those who are in charge of these issues, the Directorate for Nature Management and the Norwegian Institute for Nature Research, were not able to provide the Havgul with satisfying answer as to whether or not the consequences on the bird population would be within what would be regarded as tolerable. Hence, as the impact assessment report shows, this issue contains several unknown factors.

5.3.3 Untouched Nature and Incomplete Knowledge about Birds

The debate on the Havsul projects has revealed that arguments about untouched nature do not have a clear-cut, stable connotation. Conservationist groups like FoEN and GWoN define the concept different from actors like SRAK, the tourist industry, and the Directorate of Cultural Heritage. While the conservationists are advocates of the ecology discourse (Soper, 1996), the

latter three incorporate cultivated elements like cultural monuments into the term untouched. Nevertheless, the untouched nature argument has become an important argument for those who oppose the expansion of wind power in Norway. This is largely because by using this argument, actors like SRAK and the tourist industry can effectively draw on both the ecology and the cultivated connotation of the concept. Thereby, they can incorporate both the concerns about biological diversity (i.e. birds), and the aesthetic effects the projects will have on the elements that are a part of their cultivated local nature. By doing this, nature becomes static, something that defies new and modern interventions.

The sea birds are a symbol of this untouched nature. Furthermore, as the impact assessment study shows, the official authorities in this area do not possess sufficient knowledge to provide satisfactory answers as to whether or not the effects on the bird stock would be disastrous or tolerable. In other words, because the expert system is not able to provide answers to this problem, the result is unwanted uncertainties. For Havgul, this was tactically ineffective because it provided the opposition with the opportunity to challenge the evidence presented to support their views. Thus, this issue reveals a more general point that is related to the wind power system and its interrelated system components. Because birds have become such an important area of concern for the wind power system in Norway, the future expansion of the system depends on the incorporation of this uncertainty. However, this relies on whether or not mapping of the biological diversity in Norway becomes a political priority. If not, arguments that portray the relationship between birds and wind turbines as inherently contradictory will remain predominant. In other words, by allowing the debate to deal with uncertainties rather than knowledge, the Directorate of Nature Management and the Norwegian Institute of Nature Research constructs a ‘reverse salient’ for the wind power system (Hughes, 1987). Thereby, they leave the door open for protest groups like SRAK to use birds as an argument against wind farms.

5.4 Technoscience vs. Values

5.4.1 Creating a Governable Nature: The Impact Assessment Report

With the impact assessment report, the debate took a step away from the discussion of values towards the discussion of the validity of the 'facts' that were provided in the report. The consequences of the projects were now cast in the language of science and economics, and could in turn therefore only be questioned as such. Every potential consequence, ranging from psychosocial effects to biological diversity and tourism, was evaluated and ranked on a scale ranging from insignificant, small, medium, to large positive or negative consequence. This was done in accordance with the guidelines given by the NVE. The impact assessment report was therefore an obligatory part of the licence application procedure, and not something Havgul did to marginalize other arguments. Nevertheless, this 'scientific turn' gave the debate a new dimension. In order to make their arguments count, the actors now had to keep their facts straight. Moreover, for SRAK and those who oppose the projects, this meant that in order to convince the municipalities and the NVE to say no to projects, they had to question the findings in the report.

This scientific turn is not something that was in any way unique for the Havsul projects. On the contrary, impact assessment studies and the use of expertise, are inherent components of the technological system, and is used in both waterpower and wind power issues. In fact, there is a general point here. Controversies on technological change are often cast in a scientific language (Nelkin 1992). The problems are defined by science and it is assumed that action taken by policy makers and laypersons should be based on the facts provided by science. In other words, a linear model is assumed in which science provides 'hard facts' to which the rest of the society has to adapt. This belief in knowledge and scientific result has been conspicuous in Norway, especially in questions regarding nature and

environment. In these questions, expert knowledge has been given the role as a neutral authority, and the provider of political solutions (Asdal 2004).

This view of science has been the target of analysis within STS. One way of approaching this has been to criticize how 'nature' is treated as an object or a technical matter in the public and political discourse. Here, the notion of expertise based on the natural sciences, engineering and economics has been criticized for being technocratic (Asdal, 2005). However, others within the field of STS have argued that the relationship between science and politics should not be understood as linear. Bryan Wynne (1996) is a good example of the latter. Science and politics, Wynne argues, are co-produced; their relationship is relational, and not merely hegemonic. Furthermore, drawing from the works of Focault, actor-network-, and laboratory studies, Kristin Asdal (2005) argues that nature should be regarded as the effect, or the endpoint, of technoscientific interventions. "Science and technology represent new sources of power. They are seen as creative and productive rather than as forms of control and repression" (p. 2). In other words, science and technologies are not only political tools, but also new forms of the political: they enable politics.

For the NVE, the impact assessment report is a management tool for grasping abstract ideas about nature. Without it, the political decision-making would be left with uncertainties and the evaluation of the hierarchical order of values rather than 'facts'. The scientific 'quantification' of nature is therefore not only a source of power - it also produces a *governable nature.* In other words, with the impact assessment report, the competing natures were transferred and translated into *a governable whole.* This shows how nature and politics are co-produced, and at the same time, it illustrates the interrelatedness between the field of expertise and the field of politics. Experts enable politics in disputes over nature, and should therefore be seen as a part of the political.

However, the significance of numerical technologies in the making of the political is not based on an intrinsic power of quantified technoscience. This is, Asdal (2005) argues, because the politics of nature and its objects, including its quantified objects come into being (or not) when they encounter other entities. In other words, their effects are relational, and dependent on encounters with other entities like for example 'the economy', public health and well being, biological diversity, and climate change. These entities have been the most important entities in the controversy on the Havsul projects. Moreover, the impact assessment study has enabled them to become political. This is because the logic of quantification has brought them into being as facts and made them a governable part of the affected nature. However, this also implies that other aspects of nature are not granted the same kind of agency in the impact assessment report. Hence, the actors advocating these aspects have to find some other ways to make their arguments count.

5.4.2 Making the Non-Quantifiable Count

How can the advocates of the aspects of nature that are not quantifiable, or aspects in which the quantification does not encounter other significant entities make their arguments count in their encounters with the political? In NVE's guidelines for wind power applications, it says that the advantages must be weighed against the disadvantages, and a licence can only be granted if the advantages are greater than the disadvantages. In other words, a licence can only be granted if the NVE finds the project to be socioeconomically beneficial.[82] The problem with this, is that the advantages of a project are often much easier to quantify in terms of economics than the more value orientated disadvantages. Advantages like increased energy production and economical benefits for both individuals and the municipalities are

[82] Formal procedure for licence application for wind power (Accessed 11.07.06) http://www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=8480

both concrete and intuitive because they are quantifiable. Hence, they are easily prioritized at the expense of more abstract values, like biological diversity, in NVE's hierarchy of consequences. This shows how the logic of economy is a powerful force when it comes to environmental issues, and reflects how the NVE prioritizes the various consequences.[83] In addition, this implicit hierarchical prioritizing of consequences is impossible to test because NVE's decision is based on an overall evaluation, and not the facts alone.

This logic has been questioned by among others the FoEN. They have not come up with an alternative method for the NVE to evaluate the consequences. Instead, they have invented methods to make their arguments count within the existing licence application and impact assessment regime that the system has provided. One example of this is the way they link biological diversity issues, to more easily quantifiable entities like tourism where the consequences can be translated into money and decreased profitability:

> Some times, in these small-scale hydro issues, we bring in for example the effect on tourism. Because if a hotel owner can hire one more person because the water runs past his hotel, then it is possible to estimate the value of it. Then the disadvantages of the project are brought closer to the advantages, and then we can say that now the disadvantages are starting to become so big that the rest can be covered by the loss of natural values. This way, in some cases, the FoEN has become fairly interested in tourism… quite simply to get a large enough sum on the side of disadvantages so that there is a chance to get the natural values that are without any 'value' so close that it appears as wrong to go forward with the plans.[84]

5.4.3 The Enrolment and Counter-Enrolment of Science

While FoEN has developed strategies for making their non-quantifiable arguments count, SRAK chose a different strategy, namely to question both the objectivity of the experts, and

[83] See Asdal & Myklebust (1999) for similar argument.
[84] Interview with the director of Friends of the Earth Norway (Møre and Romsdal), Øystein Folden 22.05.2006.

the findings in the impact assessment study. In order to do so, they needed to enrol their own experts. As this case study shows, technological change creates uncertainty. This uncertainty is related to social power and planning because access to knowledge and the resulting ability to question the data used to legitimize decisions, is an essential basis of power and influence (Nelkin, 1982, p. 277). Technological expertise is therefore a crucial political resource in conflicts over science and technology.[85]

The impact assessment report was conducted and written by Havgul in cooperation with so-called independent technical authorities.[86] Havgul picked these technical authorities after a competitive tender based on the investigation program. Thereby they enrolled scientific and economic authority and competence into the actor-network. All disputes over all the areas of uncertainties were now cast in a technoscientific language. Hence, the opposition's capacity to question the findings, and thereby decomposing the actor-network, was now dependent on the counter-enrolment of science.

In their attempt to question the validity of the report, SRAK chose two different strategies. Firstly, they tried to question the technical authorities' status as independent and objective. Secondly, they tried to question the results in the report by, among others, enrolling other protest groups from USA and Denmark, and use their 'scientific' counter arguments. These strategies were in various degrees also supported by other actors like for example the RBL.

The Notion of Objectivity and Independence

The only official requirements regarding the impact study reports are related to style and content. The report has to address and provide answers to all the topics that are laid down in

[85] See also Latour (2004).
[86] See appendix III for complete list of firms. The use of the term *technical authorities* will in this text refer to bodies/ organizations with technoscientific expertise that has been given a formal role in the application procedure.

the investigation program. However, there are no rules regarding the formulation of the report. On the contrary, the applicants are free to formulate the report as they wish based on the results provided by the technical authorities. Thus, there is no clear-cut distinction between the licence application and the impact assessment report. This makes the hearing round extremely important. If there are any errors, or anything lacking in the report, the NVE or the bodies entitled to comment stand free to point this out. The NVE can then demand an additional study.

This procedure should theoretically ensure the validity of the facts provided. Nevertheless, several actors have questioned the reports based on what they see as a false notion of independency. The reports, they argue, are bought and paid for, and they are custom made for Havgul's licence application. For SRAK's part, this argument supported their basis for questioning the results in the report. Why should the result from this report be taken seriously when it is something Havgul has paid for?

The RBL and the FoEN also questioned the rhetoric used in the report. The rhetoric, they argue, is constructed to highlight the positive-, and de-emphasize the negative aspects. One example of this rhetoric is the way in which Havgul has illustrated the size of the economic compensation they have offered the affected municipalities. The compensation is illustrated and quantified by the number of new kindergarten and nursing home places that the municipalities can provide to their residents if they say yes to the Havsul projects. Another example is the description of how the projects will affect the employment situation in the area. In their description of how the projects on the positive side will create new jobs, Havgul's estimations are presented in terms of numbers of new jobs. However, in their description of how the projects will affect the employment situation in the tourist industry negatively, they calculate it in percentages.

Questioning the Results

With the impact assessment report, the debate took a scientific turn. This entailed that in order to criticise the projects, the criticism had to be based on scientific arguments. Thus, SRAK and the other actors could no longer only base their arguments about risk assessment on values: 'facts' had now become the only political valid currency.

Instead of sticking with the arguments about the inconsistent global nature, and the threat to local practices, SRAK chose to challenge the Havsul projects in the domain of scientific expertise - risk assessment. In order to do so, they had to enrol their own experts. The organization did not possess any expert knowledge of their own, so they had to base their arguments on expert counter-arguments used in similar conflicts on wind power. They did this by enrolling two similar protest groups, and by labelling their arguments as expert statements. These two groups were "Save Upstate New York" and "Naboer til Vindmøller" (Neighbours of Windmills) from Denmark.[87] In addition, they have attempted to enrol other experts that are negative towards Havsul.[88]

By enrolling these groups, SRAK tried to question the risk assessment made in the impact assessment study. The physical and psychological risks, which these groups claimed to have experienced as a result of wind turbines, were now brought into debate on the Havsul projects. Thereby, SRAK tried to establish a link between wind turbines and these risks.

Noise and shadow casting are two known negative bi-products of wind turbines.[89] Hence, along with wind resources, grid capacity, and energy demand, distance to the nearest becomes the most important factor when deciding a wind farm's localisation. Havgul has therefore argued that because the wind farms are placed offshore, the risk of experiencing

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[87] See http://www.savupstatenewyork.com and http://www.naboertilvindmoller.dk/

[88] A good example of this, is a article from NRK that they have referred to on their website. Here, a professor in economics states that he does not believe in the Havsul projects because they will be dependent on subsidies from the government. See http://www.nrk.no/nyheter/distrikt/more_og_romsdal/1.930655

[89] Shadow casting is caused by the sun rising or setting behind the rotating blades of a turbine. The shadow created by the rotating blades can cause alternating light and dark shadows to be cast on roads or nearby premises, including the windows of residences, resulting in distraction and annoyance to the residents.

noise and shadow casting from the wind turbines is almost nonexistent. This claim is supported by the impact study. Nevertheless, throughout the debate, SRAK has continued to argue that if the projects are realised, noise and shadow casting will force the affected inhabitants to move. Moreover, SRAK has attempted to cast these counter-arguments in a scientific language, questioning the validity of the impact assessment report.

Despite the fact, that SRAK's counter-arguments have been rebuked several times, from among others Havgul and the NVE, the results from the hearing round show that SRAK has largely managed to convince the local politicians to go against the projects. However, for a period of time, it looked as if though the fact that their claims had been rebuked would turn the local politicians' attitudes around. After Havgul arranged a study tour to Horns Rev in Denmark, where they invited one participant from each party from all of the affected municipalities, several of the participating local politicians stated that they had changed their minds. In other words, Havgul put the numbers from the impact assessment study to work by letting the politicians experience a large-scale wind farm for themselves. Nevertheless, this was not enough to convince the people of Giske or the politicians of Ålesund who both said no to the projects after this trip. Whether or not this was the decisive factor that made the politicians of Haram and Sandøy say yes to the projects, is not possible to say, as their hearing statements are not yet available. However, scare tactics or not, it is a fact that Havsul I is now the only one of the four projects where the affected municipality has advised the NVE to grant a licence. This is of course not the work of SRAK alone, but it is beyond any doubt that they have come play an extremely important role in this conflict.

5.4.4 The Importance of Experts in the Political

In chapter 2, I argued that it is necessary to see the construction of the actor-network (or subsystem) as interrelated to, not only other networks, but also technological systems. The

wind power system consists of several powerful interlocking components that contribute to the shaping of the system. The use of technical authorities in the impact assessment study has been important in the sense that it has translated and transformed nature into a governable whole, and thereby enabled political decision-making. At the same time, it has given the debate a technoscientific frame that has turned certain parts of nature into valid - and others into invalid political currency.

The strong interdependence between the NVE and the technical authorities illustrates how the expert system and the political system are both relational and co-produced. Through its encounter with the political, the expert system is given authority, and at the same time, the very notion of expertise is defined. The technical authorities are not only individual actors that contribute to the construction of the actor-network; they are also representatives of the expert system. This expert system is upheld by the notion of, as well as the social closure around certain predefined professions like engineers and economists.[90] This effective closure, combined with the strong relationship with the political, has given the system a *momentum.* Hence, it is now difficult challenge, and almost impossible to overthrow.

The strength of the expert system, and its relation to the political, has traditionally stood strong in conflicts over similar projects. Thus, the fact that SRAK was able to create doubt over the findings in the impact study is unique. The procedure concerning the use of technical authorities in the impact study is an institutionalized component of NVE's practice, and they therefore have no reason to question it. However, this does not matter as long as SRAK was able to convince both the local politicians and the affected inhabitants otherwise. Secondly, the very concept of expertise is tied to an established profession. The experts are not only individual actors; they represent a system of knowledge production. Moreover, in the encounter with the political (the NVE), only actors that are a part of this system are given the

[90] See Weber (1994) for a more detailed description of social closure and professions.

status as experts. Hence, because they do not fit the established criteria of expertise, the experts SRAK tried to enrol are not given any credibility by the NVE. Nevertheless, SRAK was still able to convince both the inhabitants, and the local politicians, that the wind farms would indeed pose a threat to the people that would be living next to them. In other words, because SRAK was able to question both the objectivity and the findings in the impact study and thereby convince both politicians and inhabitants, they effectively neutralized one of the most solidly interrelated components in the system - the expert system. Moreover, as long as they were able to do this, it does not matter whether or not the NVE relies only on solid facts. On the contrary, all SRAK had to do was to convince the local politicians that they were telling the truth, and because these politicians are not experts themselves, they became a much easier hurdle to climb than the NVE. In this sense, the conflict shows how local self-government has contributed to bringing the ability to question technoscience into the democratic process.

6 Towards a Conclusion

The theme that runs throughout the thesis is how the wind power opposition has managed to influence the political process regarding the Havsul projects by questioning well-established system functions. The Norwegian energy system has traditionally been a powerful technological system. Encompassing system components like politics, legislative artifacts, consumers, and technoscientific expertise, the system has reached a momentum where continued growth in energy production is the superior system goal. However, as we have seen, when the system tries to incorporate a new energy technology, wind power, new problems develop: actors from the system's environment start to question the inner system logics and manage to neutralize the system arguments. The fact that they succeed in doing this, is largely because when the system faces problems, a scope of action is created whereby exogenous actors become able to influence the political process through a struggle to conceptualise nature.

In their attempt to construct a functioning actor-network, Havgul constructed two obligatory passage point to which they made themselves an indispensable part of the solution. The problems in need of solving were global warming and the energy crisis in Møre and Romsdal. However, by calling attention to the underlying political inconsistency in the global nature argument, SRAK effectively managed to neutralize it. Thereby, they created a scope of action where the local consequences became increasingly important. By doing this, they also neutralized the wind power system's strongest asset - environmentally sound energy production. What was left of the Havsul projects was therefore a conflict intensive alternative solution to the energy crisis.

The Norwegian energy system has a tradition of transforming natural resources like water (and to some extent gas) into electricity. This has demanded large interventions in

nature, but because it has had political support, the development of waterpower has never been stopped by protesting interest groups. However, as we have seen, system arguments like the compensation agreements, which have been used in waterpower issues for years, are now being effectively challenged by SRAK. In addition, the tourist industry has now become a political prioritized and well-organized actor that challenges the energy system's power over the Norwegian nature. Hence, they have become able to question arguments about job creation on the grounds that the projects that provide these jobs, will affect the employment situation in the tourist industry negatively. This leads to a local political dilemma where the promised benefits from wind power projects has to be weighed against the potential damage to the tourist industry. In addition, as the Havsul controversy shows, the tourist industry also has powerful allies. The alliance between the tourist industry, SRAK, and environmentalist organizations like the FoEN and GWoN, has made it difficult for the municipalities to go against the industry's interests. What these groups have in common, is the emphasis on the importance of untouched nature and wind turbines as 'matter out of place' (Douglas, 1991). However, as we have seen, the term untouched is by no means used in a uniform way. On the contrary, it combines conservationism with cultivated local nature. Thereby, the concept becomes static and absolutist, and defies modern interventions. Thus, by using both meanings of the concept, RBL, SRAK, and the environmentalists, could let the term refer to cultivated or uncultivated nature. In other words, they could support both the argument about local practices, the tourist industry, and the environmentalists' ecology discourse (Soper, 1996).

As a symbol of this untouched nature, the sea birds became influential actors in the conflict. The incidents at the Smøla wind farm, where sea eagles are being killed, were the wind power industry's first experience with birds crashing into the wind turbines on such a large scale. In the wake of this, the sea birds became influential actors also in the conflict on the Havsul projects. The fear of collisions, combined with the fact the plan areas are localized

in the middle of the birds' migratory path, made the birds a source of concern. In fact, as we have seen, they were the only actors who managed to force Havgul to adjust their plans. Hence, they have become a problem, not only for Havgul, but also for the expansion of the wind power system. In other words, the birds become a 'reverse salient' (Hughes, 1987). Moreover, because the official authorities are not able to provide sufficient information about the birds in particular, and the biological diversity in general, the 'reverse salient' is difficult to solve. This constitutes a serious problem for the wind power system, because the decision-making has to be made within a context of limited knowledge about the environmental impact. The result of this is, as we have seen from this conflict, that the bird issue becomes crucial argument, not only for ornithologists and for environmentalists, but also for civil protest groups like SRAK.

With the impact assessment study, the local nature was transformed into a governable whole by the use of technoscientific quantification. The study was conducted by so-called independent technical authorities, and was a part of the licence application. The purpose of the study was to enable fact based political decision making. However, as we have seen, during the hearing round, SRAK and the opposition managed to create doubts about both the objectivity, and the validity of the findings in the report. Thereby they were successful in convincing several of the local politicians, and the townspeople, to go against the Havsul projects. The reason why they managed to do this was that they succeeded in enrolling other protest groups that served as first hand witnesses to the consequences that are caused by wind turbines. Despite the fact that this counter enrolment of 'expertise' does not carry any weight in NVE's decision, it was enough to influence the municipal decisions. In other words, because local politicians are not experts, local self-government enabled SRAK to bring in the ability to question technoscience into democracy.

The result of the struggle to conceptualise nature, which I have described in this thesis, has been important in the sense that only one of the projects has gotten a municipal recommendation. The reason for this is that because of system problems, a scope action was created where exogenous actors like SRAK, the tourist industry, environmentalists, and the sea birds could question the system logics. Thereby, they prevented Havgul from succeeding with the translation process. As we have seen, problems have been defined and enrolment has come as a result of interessement, but in the sense that there have been signs of mobilization, it has been too little, too late. Hence, if the Northern Gannet population (the English word for Havsul) is going to fly in the wind that blows from the ocean during summer (the English translation of Havgul), it looks as if the population is going to be small.

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See http://www.savupstatenewyork.com and http://www.naboertilvindmoller.dk/

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Hearing Statements to the Licence Application:
Den norske turistforening
Direktoratet for naturforvaltning
Giske reiselivsforum
Miljøvernforbundet
Natur og Ungdom
Naturvernforbundet
Norsk ornitologisk forening, avd. Møre og Romsdal
Ope landskap
Riksantikvaren
Stopp Raseringen av Kysten
The county of Møre and Romsdal
The municipality of Averøy
The municipality of Eide
The municipality of Fræna
The municipality of Ålesund
Vindmøllefritt Giske

Havgul AS:
The advance notice (December 2004):
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http://www.havsul.no/Index.asp?Lang=Nor&Meny=3&Sub=97&id=179

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http://www.havsul.no/Index.asp?Lang=Nor&Meny=3&Sub=96&id=178

About the power situation in Møre and Romsdal (Accessed 17.08.2006):
http://www.havsul.no/Index.asp?Lang=Nor&Meny=4&Sub=95&id=177

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http://www.havsul.no/Index.asp?Lang=Nor&Meny=4&Sub=93&id=175

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"Vil norske strømpriser stige ytterligere de neste årene?" (Accessed 23.08.2006):
http://www.troms-kraft.no/vie/bedrift/aktuelt_i_energibransjen/ebl_priser_stige.htm,

Appendix I: List of Abbreviations

ANT	Actor-Network Theory
DPR	The Directorate of Public Roads
FoEN	Friends of the Earth Norway
GwoN	Green Warriors of Norway
IPCC	The International Panel on Climate Change
NDF	The Norwegian Diver Association
NOF M&R	The Norwegian Ornithological Society, Division Møre and Romsdal
NVE	The Norwegian Water Resources and Energy directorate
RBL	The Norwegian Hospitality Association
SCOT	Social Construction of Technology
SRAK	Stopp Raseringen av Kysten
SSK	Sociology of Scientific Knowledge
STS	Science and Technology Studies

Prefixes for Units of Energy:

Wh	Watt hour(s)
KWh	Kilowatt hour(s)
MWh	Megawatt hour(s)
GWh	Gigawatt hour(s)
TWh	Terawatt hour(s)

Appendix II: List of Interviewees

Bjerke, Bjørn: CEO of the Norwegian Hospitality Association, Region Mid-Norway.

Dirdal, Harald: Havgul AS.

Folden, Øystein: Director of Friends of the Earth Norway (Møre and Romsdal).

Haavik, Henriette: The Norwegian Water and Energy Directorate.

Kismul, Ane: Director of the Norwegian Wind Energy Association (NORWEA).

Kvassheim, Gunnar: Chairman of the Standing Committee on Energy and the Environment.

Larsen, Tine: Zero (Zero Emission Research Association).

Molnes, Torill: Director of ”Stopp Raseringen av Kysten”.

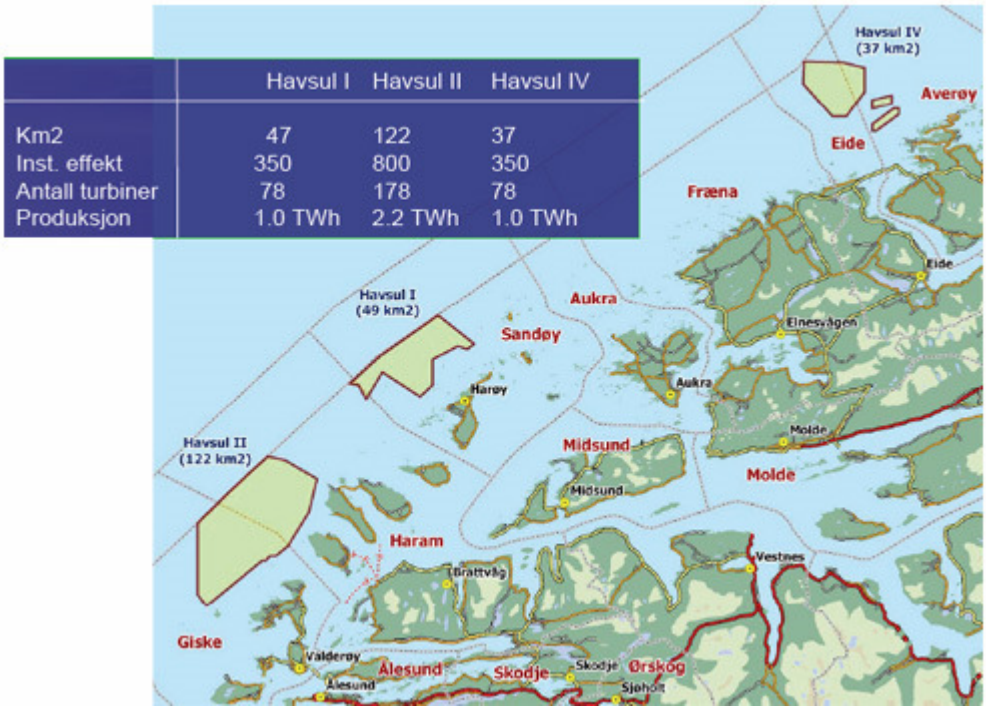
Due to the fact that my interviewees are located in different parts of the country, I chose to do the interviews with those who were located outside Oslo by telephone. All the interviews were transcribed, and a transcript of the interview was sent to the interviewees for approval. In addition to this, I gave the interviewees the opportunity to comment on, and approve the quotes that I have used. It is worth noticing that I have chosen only to use quotes from some of the interviews. There are several reasons for this: some of the interviewees were reluctant to be quoted, some were only used as background material, and others were not used because I did not have the time to wait for them to approve the quotes. Hence, instead of using quotes from all the interviews, I have used official material like websites, newspaper articles, and hearing statements.

Appendix III: List of Companies that Contributed to the Impact Assessment Study on Havsul I, II and III

Firma		Ansvarsområde / bidrag
NVK Multiconsult AS v/ Brian Glover og Kjetil Mork Postboks 280 1401 Ski Tlf: 64 85 55 00 E-post: kjetil.mork@multiconsult.no Internett: www.multiconsult.no	NVK MULTICONSULT Partner i NORPLAN	Ansvar for koordinering av øvrige konsulenter og utarbeidelse av hovedrapporten (konsesjonssøknaden).
Multiconsult AS v/ Lars Toverud og Roar Lie Postboks 265, Skøyen 0213 Oslo Tlf: 22 51 50 00 E-post: lars.toverud@multiconsult.no Internett: www.multiconsult.no	MULTICONSULT	Planlegging/prosjektering av fundamenter
EMD International A/S v/ Per Nielsen Niels Jernes Vej 10 9220 Aalborg, Danmark Tlf: +45 96 35 44 50 E-post: pn@emd.dk Internett: www.emd.dk	EMD International A/S	Ansvarlig for micro-siting, sammenstilling av vinddata, produksjonsberegninger, støyberegninger, visualiseringer og utarbeidelse av kart over skyggekast.
EPC Management ApS v/ Johny Liebst Havrevangen 5A 8400 Ebeltoft, Danmark Tlf: +45 86 34 13 24 E-post:epc-management@mail.dk	EPC Management	Rådgiver på den tekniske siden; fundamenter, vindturbiner, infrastruktur, kostnadsberegninger, etc.
Jøsok Prosjekt AS v/ Reidar Jøsok Kokstaddalen 26 5257 Kokstad Tlf: 55 22 90 11 E-post: reidar.josok@josok-prosjekt.no	JØSOK PROSJEKT AS	Planlegging/prosjektering av overføringslinjer (internt og mellom vindpark og eksisterende nett) og trans-formatorstasjoner. Ansvarlig for utarbeidelsen av konsessjons-søknadene for overføringslinjene.
SWECO Grøner AS v/ Tor Morten Sneve Postboks 400 1327 Lysaker Tlf: 67 12 80 92 E-post: tor.sneve@sweco.no Internett: www.sweco.no	SWECO GRØNER	Prosjektenes innpassing i kraft-systemet, modellering av nytt nett, lastflyanalyser, tapsvurderinger, spenningsanalyser, vurdering av behov for reaktiv kompensering, dynamiske analyser og beregning av parkenes inn-virking på spenningskvaliteten i form av spenningsfall, spenningssprang, flimmer og overharmoniske strømmer.
ISTAD NETT AS v/ Kristoffer Sletten Plutoveien 5 6405 Molde Tlf: 71 21 35 00 e-post: kristoffer.sletten@istad.no Internett: www.istad.no	ISTAD ISTAD NETT AS	Samarbeid med Sweco Grøner (se ovenfor)

Firma		Fagområde
NVK Multiconsult AS v/ Brian Glover, Kjetil Mork og Alexander Kristiansen Postboks 280, 1401 Ski Tlf: 64 85 55 00 E-post: kjetil.mork@multiconsult.no Internett: www.multiconsult.no	NVK MULTICONSULT Partner i NORPLAN	Friluftsliv og reiseliv Samfunnsmessige virkninger Forurensning Bunn- og strømningsforhold Skyggekast Annen arealbruk
Multiconsult AS v/ Mari-Ann Ekern, Lene Nagelhus og Stein Christiansen Postboks 265, Skøyen 0213 Oslo Tlf: 22 51 50 00 Internett: www.multiconsult.no	MULTICONSULT Totalleverandør av rådgivningstjenester	Landskap Kulturminner og kulturmiljø (for vindparken) Støy
Miljøfaglig Utredning AS v/ Bjørn Harald Larsen, Geir Gaarder og Morten Melby Bekkjen, 6630 Tingvoll Tlf: 71 53 17 50 E-post: melby@miljofaglig-utredning.no Internett: www.miljofaglig-utredning.no	MILJØFAGLIG UTREDNING AS	Biologisk mangfold og verneinteresser Friluftsliv og reiseliv
Rådgivende Biologer AS v/ Geir Helge Johnsen Bredsgården, Bryggen, 5003 Bergen Tlf: 55 31 02 78 E-post: post@radgivende-biologer.no Internett: www.radgivende-biologer.no	Rådgivende Biologer AS	Marinbiologi Fiske og havbruk Bunn- og strømningsforhold
Høgskolen i Ålesund v/ Norvald Kjerstad 6025 Ålesund Tlf: 70 16 12 00 E-post: norvald.kjerstad@hials.no Internett: www.hials.no	HØGSKOLEN I ÅLESUND	Navigasjon og skipstrafikk
Teleplan AS v/ Eldar Aarholt Postboks 69 1324 Lysaker Tlf: 67 12 70 00 E-post: aar@teleplan.no Internett: www.teleplan.no	Teleplan	Radarkommunikasjon og flysikkerhet
Odel AS v/ Torbjørn Røberg Selteveien 188, 3512 Hønefoss Tlf: 90 62 76 14 E-post:odel@odel.no Internett: www.odel.no	ODEL RÅDGIVNINGSTJENESTE INNEN ARKEOLOGI	Kulturminner og kulturmiljøer (for 420 kV linjen mellom Skjeltene/Hildre og Giskemo)

Appendix IV: Map of the plan area.



	Havsul I	Havsul II	Havsul IV
Km2	47	122	37
Inst. effekt	350	800	350
Antall turbiner	78	178	78
Produksjon	1.0 TWh	2.2 TWh	1.0 TWh

Havsul II is located just outside Ålesund